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(54) **SYSTEM AND METHOD FOR AUTOMATICALLY CREATING PERSONALIZED COURSES AND TRACKABLE ACHIEVEMENTS**

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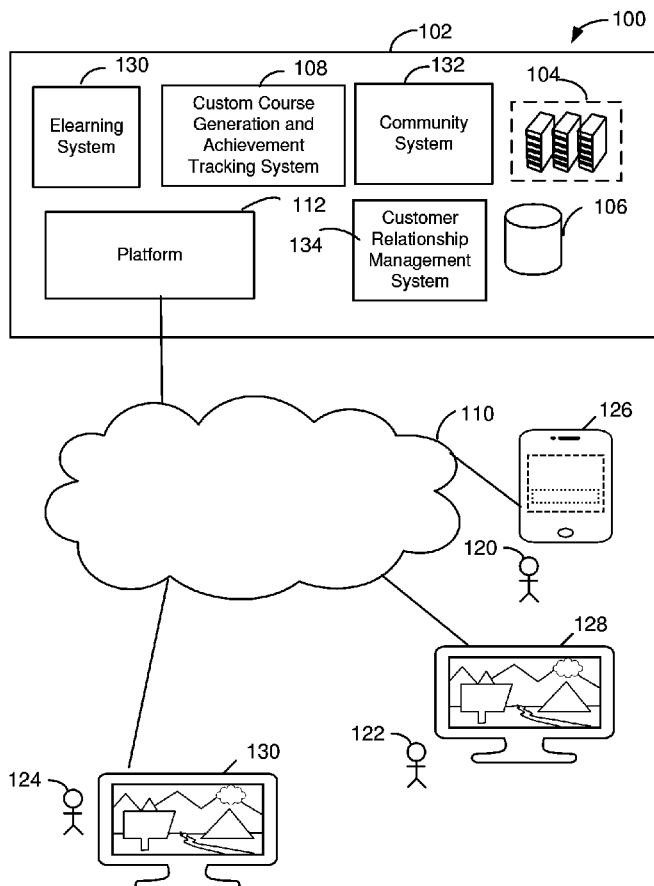
(57) **ABSTRACT**
 Disclosed are some implementations of systems, apparatus, methods and computer program products for generating custom courses for users. A goal of a user of a database system is ascertained and users of a database system that have reached the goal are identified. A list of content items including educational content is generated. The list can be generated using artificial intelligence or computer-generated models. In addition, dependency trees can be applied during the generation of a computer-generated list of content items. The content items can represent a variety of resources including educational learning modules or trails, as well as other actions that the user can take to reach their goal. The list can be provided via a web page for display by a client device, and the user can interact with the list. The user's achievements with respect to the list are tracked and a record of the user's achievements can be updated within the web page, as well as other web pages for access by other users.

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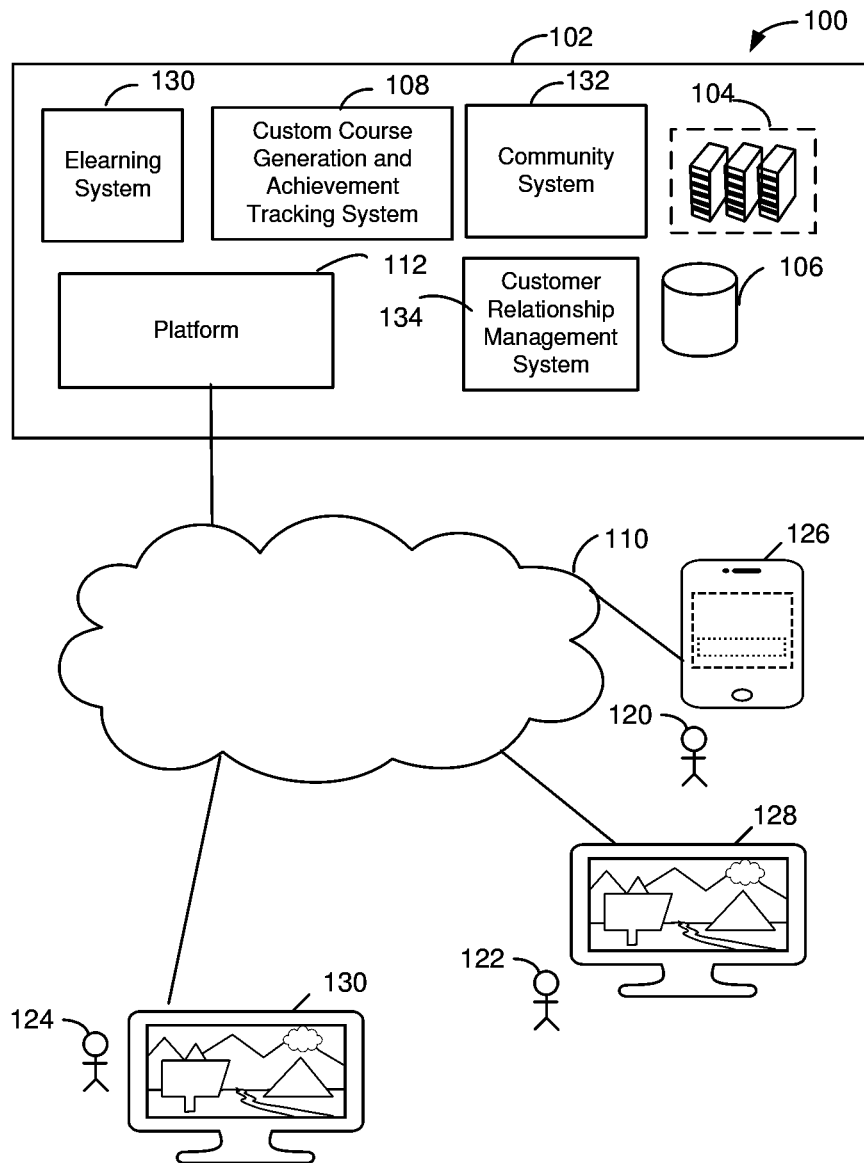


Figure 1

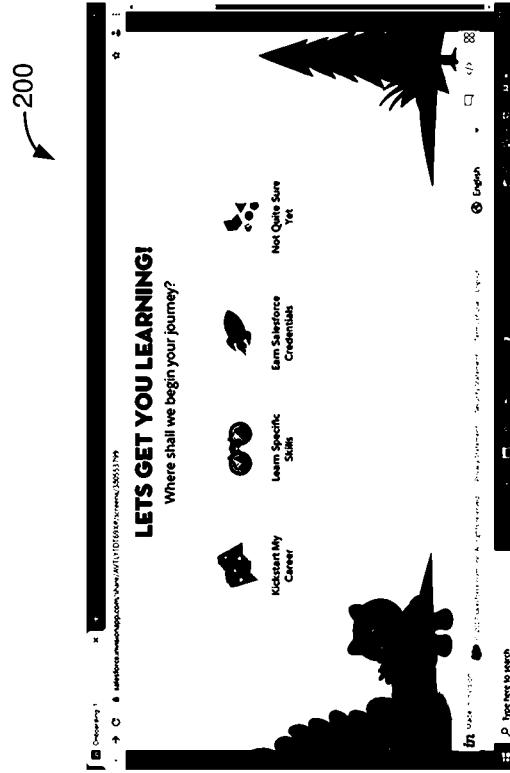


FIGURE 2

300

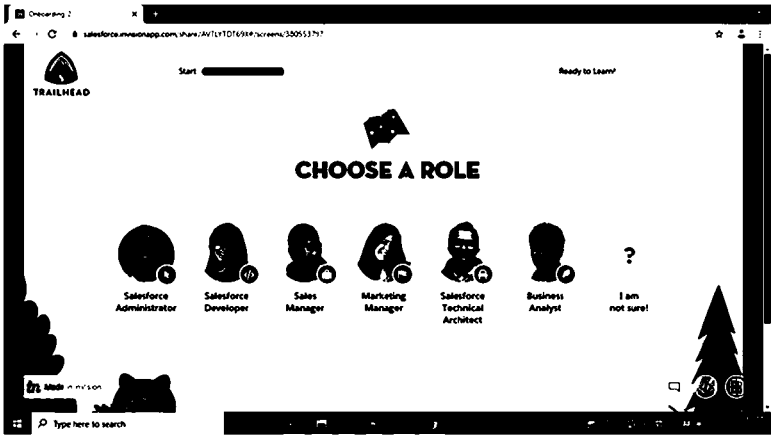


FIGURE 3

400

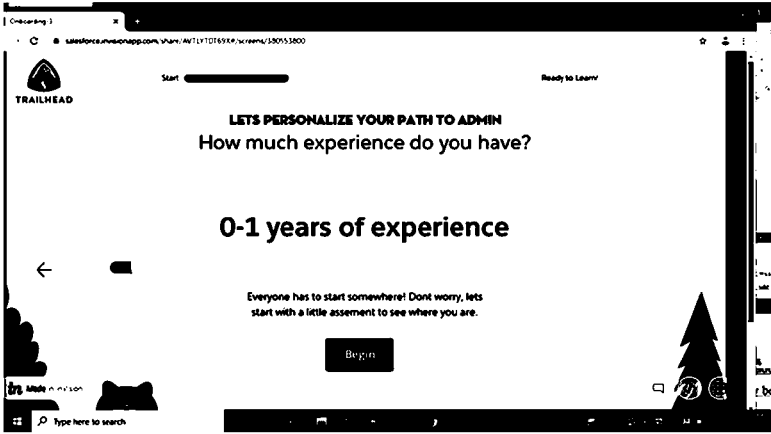


FIGURE 4

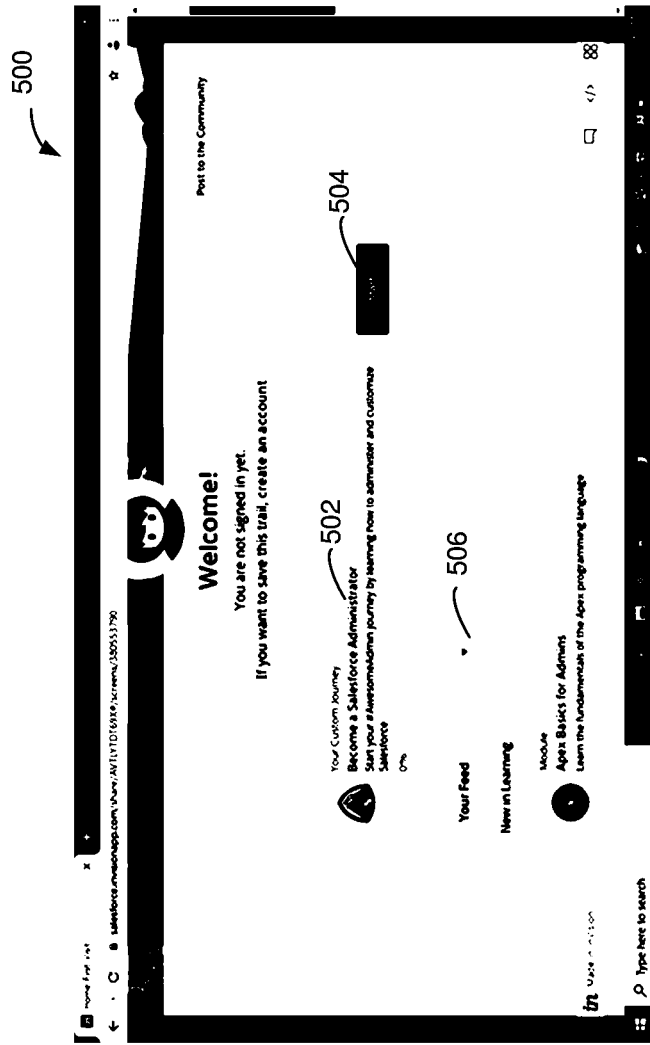


FIGURE 5A

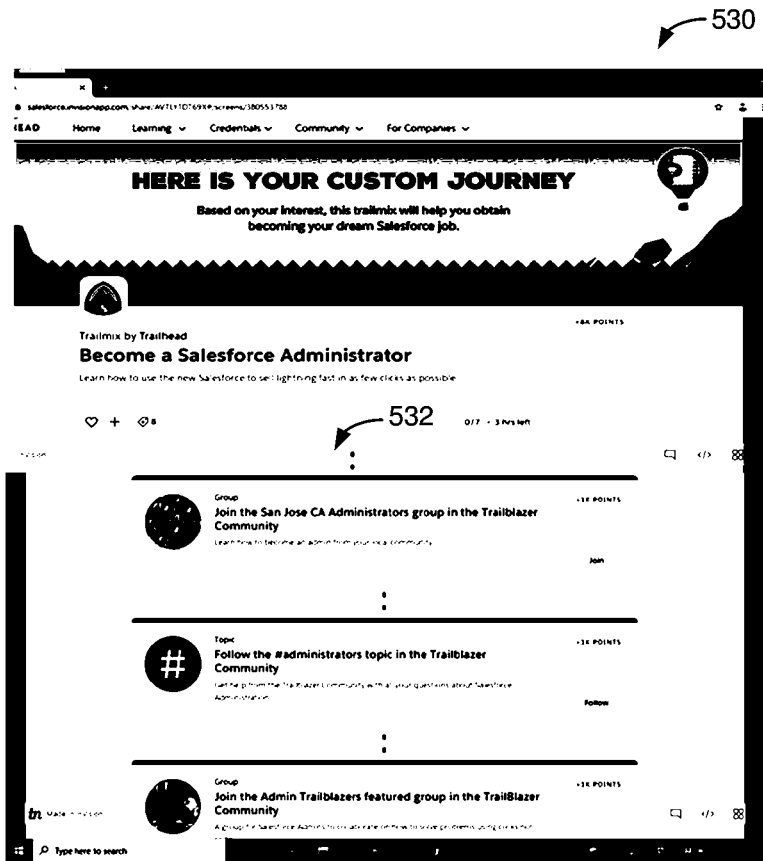


FIGURE 5B

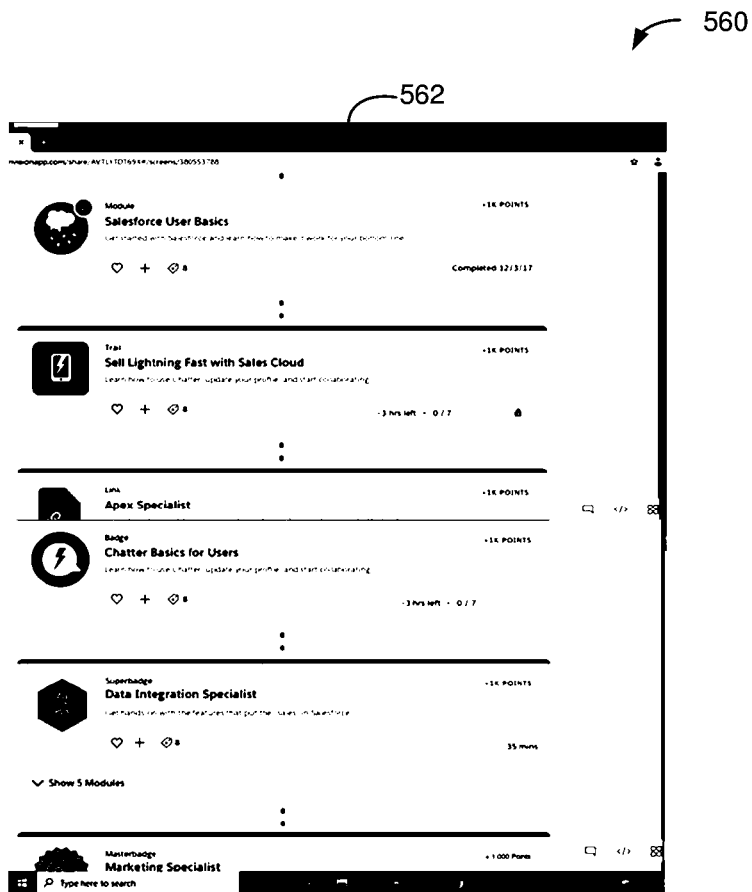
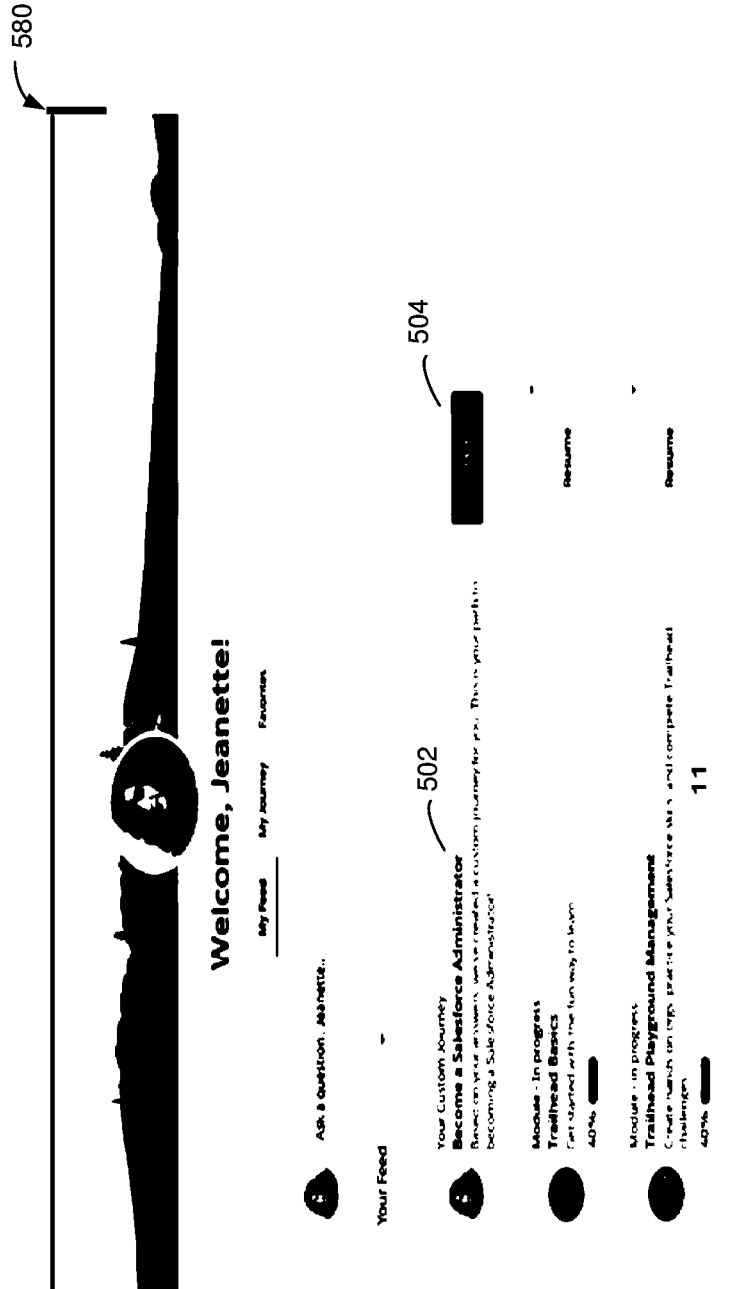


FIGURE 5C



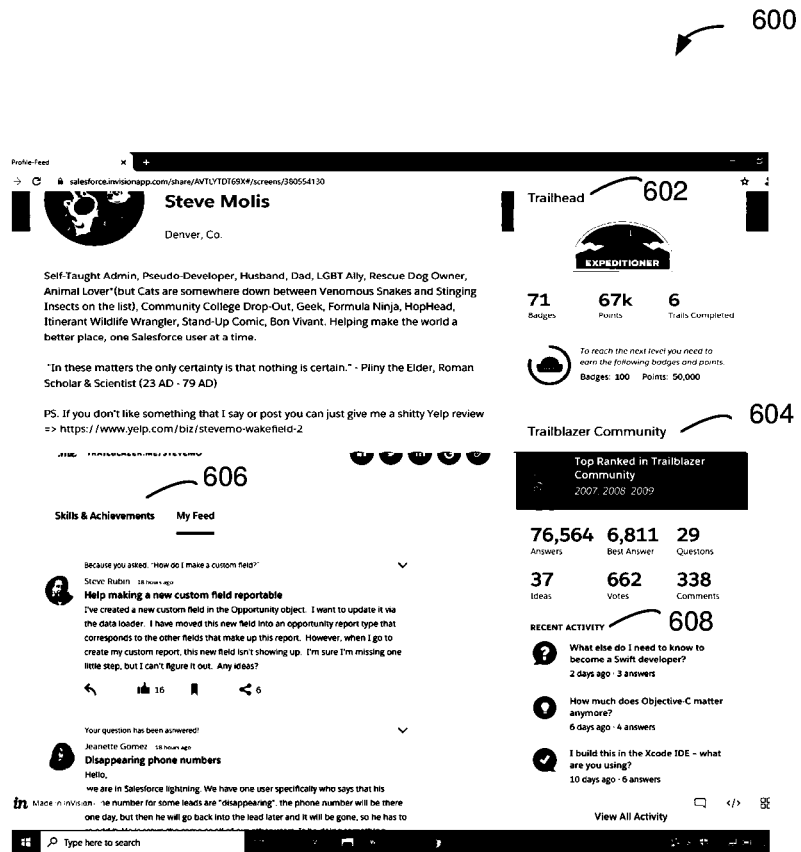


FIGURE 6A

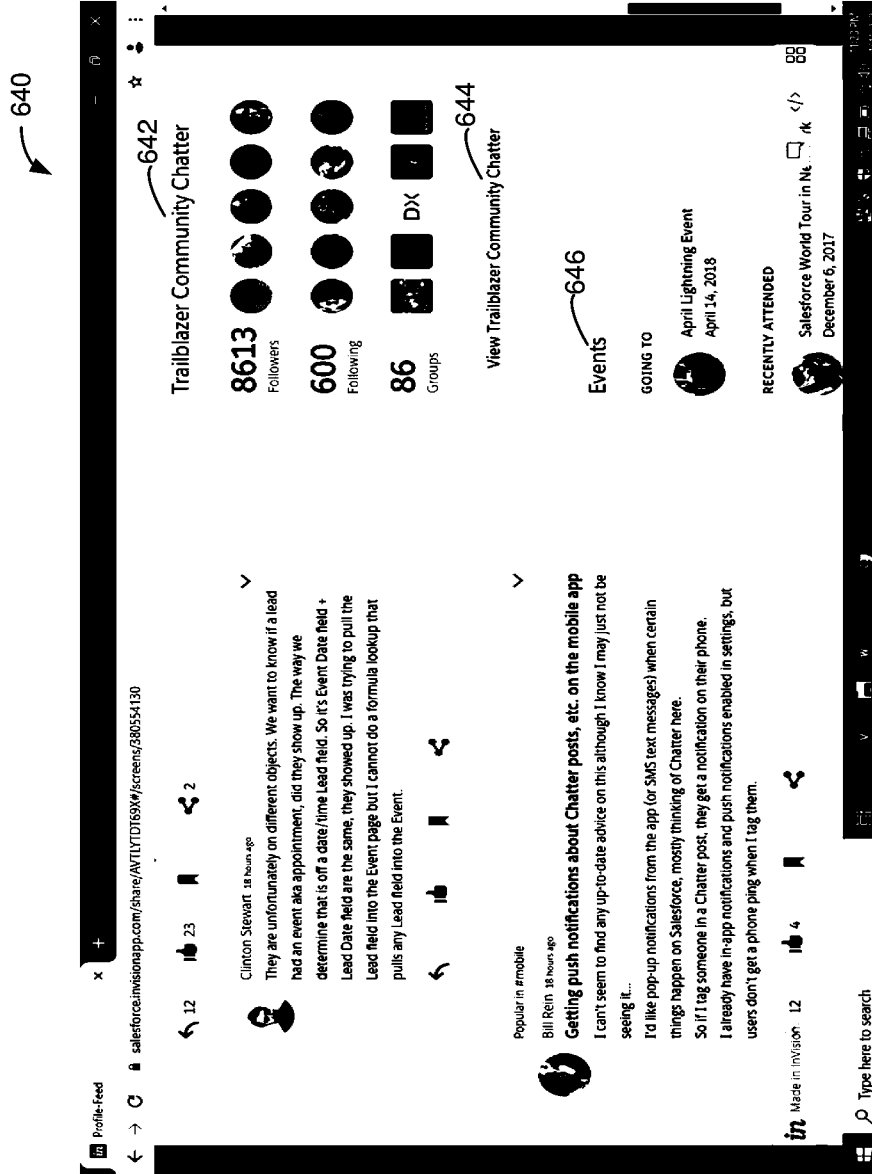


FIGURE 6B

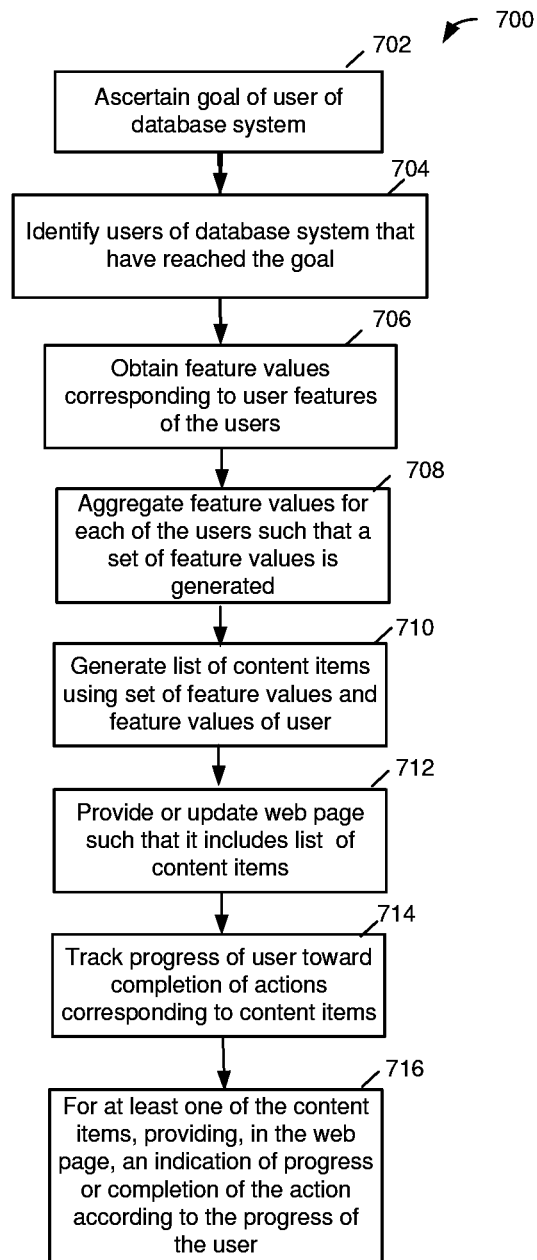


FIGURE 7

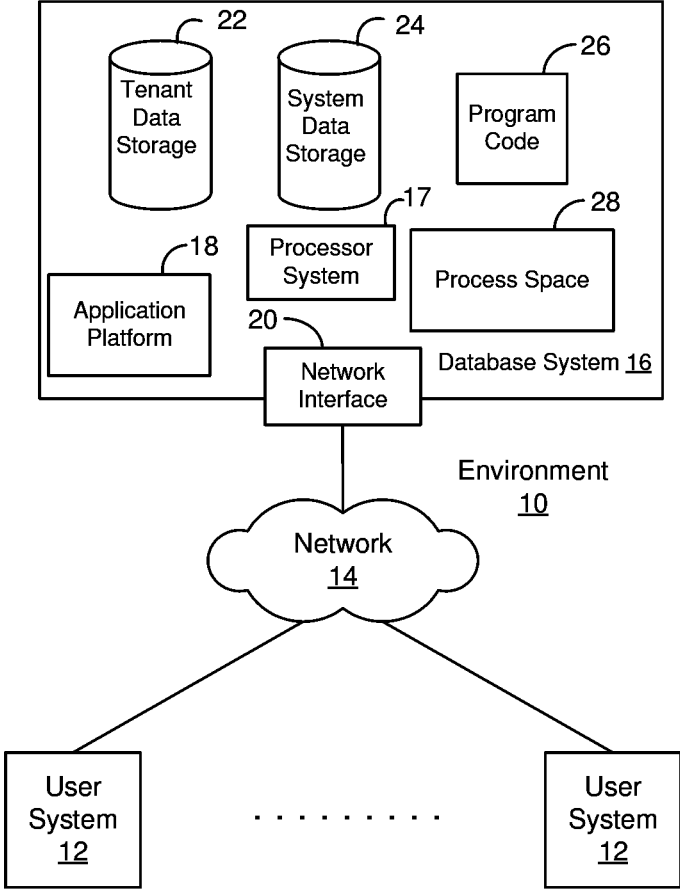


Figure 8A

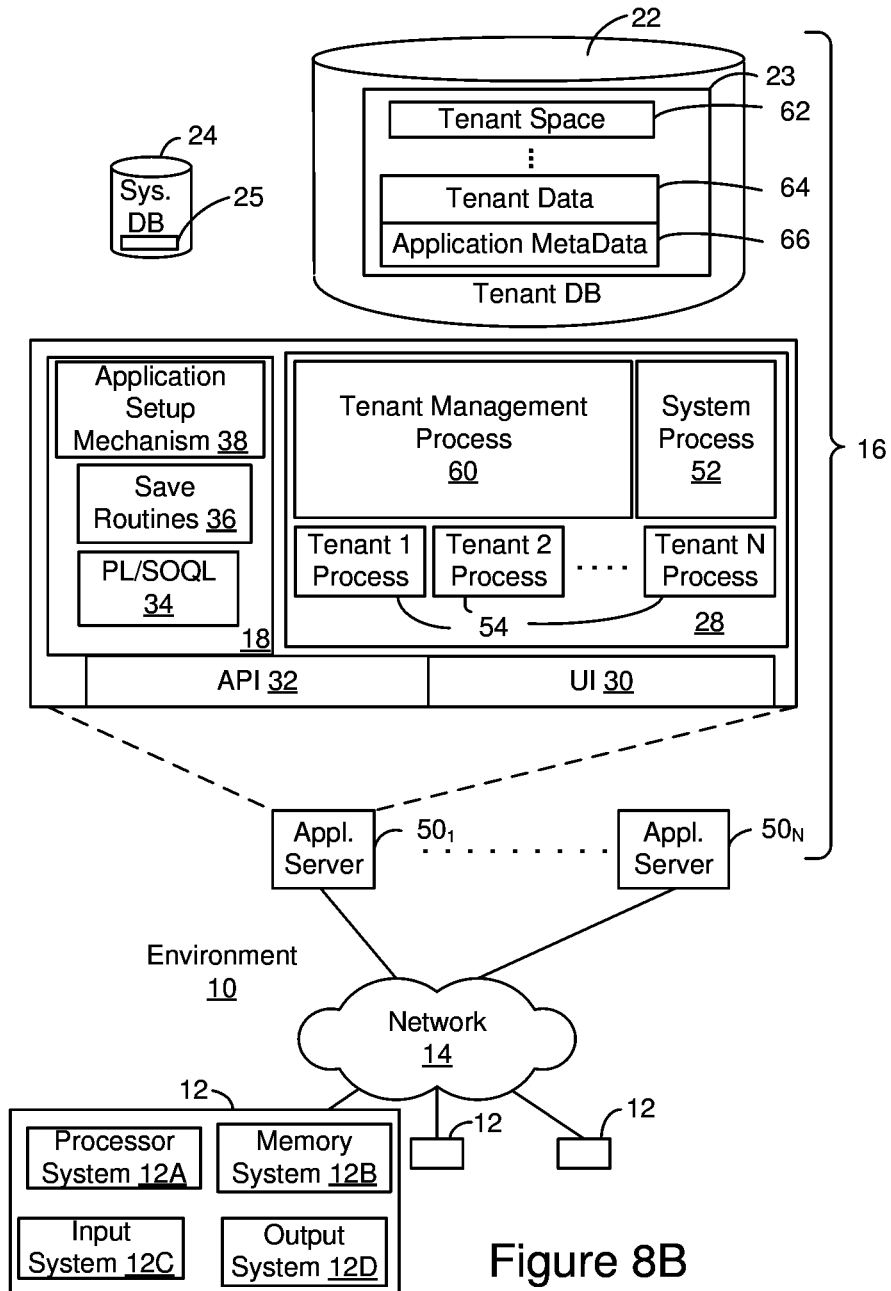


Figure 8B

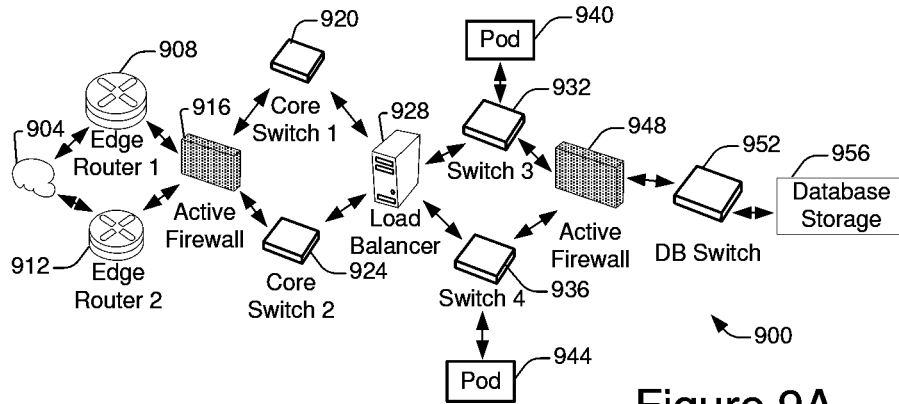


Figure 9A

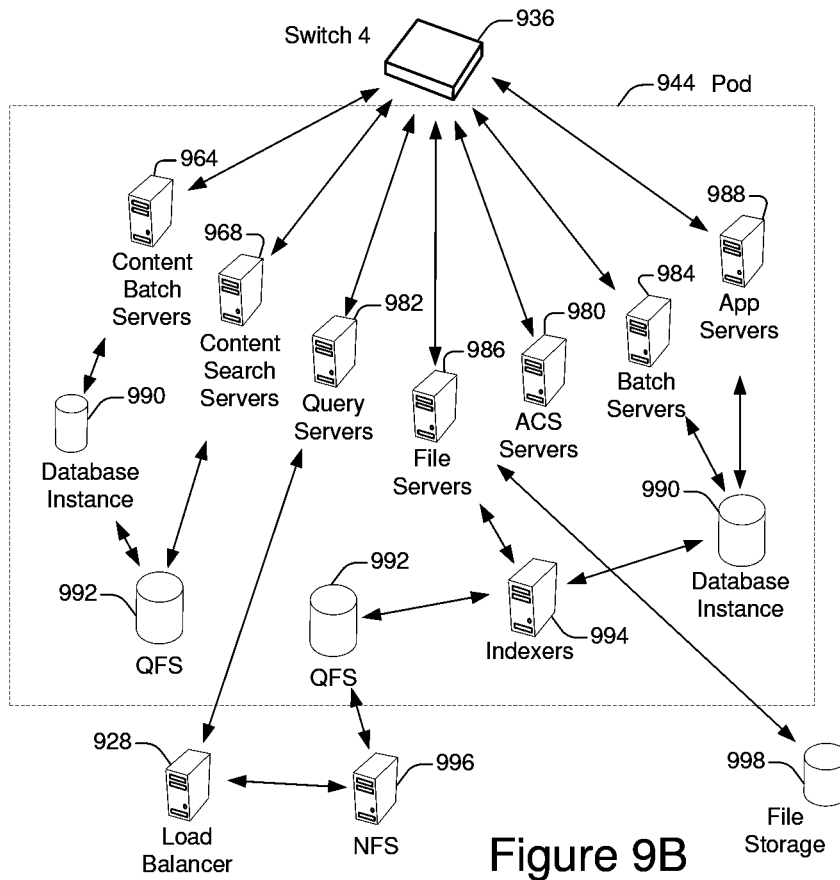


Figure 9B

**SYSTEM AND METHOD FOR
AUTOMATICALLY CREATING
PERSONALIZED COURSES AND
TRACKABLE ACHIEVEMENTS**

INCORPORATION BY REFERENCE

[0001] An Application Data Sheet is filed concurrently with this specification as part of the present application. Each application that the present application claims benefit of or priority to as identified in the concurrently filed Application Data Sheet is incorporated by reference herein in its entirety and for all purposes.

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TECHNICAL FIELD

[0003] This patent document generally relates to systems and techniques associated with automated generation of custom courses. More specifically, this patent document discloses techniques for automatically generating custom courses that include electronic learning (eLearning) content and tracking user achievements in relation to the custom courses.

BACKGROUND

[0004] “Cloud computing” services provide shared network-based resources, applications, and information to computers and other devices upon request. In cloud computing environments, services can be provided by servers to users’ computer systems via the Internet and wireless networks rather than installing software locally on users’ computer systems. A user can interact with a variety of systems such as social networking systems, email systems, and instant messaging systems, by way of example, in a cloud computing environment.

[0005] Electronic learning (eLearning) is the delivery of learning and training through digital resources. Typically, eLearning is provided through electronic devices such as computers, tablets, and cellular phones that are connected to the Internet. eLearning is a valuable tool since users can complete a course or program from any location.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The included drawings are for illustrative purposes and serve only to provide examples of possible structures and operations for the disclosed systems, apparatus, methods and computer program products for leveraging and managing assessment environments in an assessment hub. These drawings in no way limit any changes in form and detail that may be made by one skilled in the art without departing from the spirit and scope of the disclosed implementations.

[0007] FIG. 1 shows a system diagram of an example of a database system 100 in which automated course generation and trackable achievements may be implemented, in accordance with some implementations.

[0008] FIG. 2 shows an example of a graphical user interface (GUI) 200 configured to obtain a user’s goal, in accordance with some implementations.

[0009] FIG. 3 shows an example of a GUI 300 configured to ascertain a user’s role, in accordance with some implementations.

[0010] FIG. 4 shows an example of a GUI 400 configured to ascertain a user’s level of experience, in accordance with some implementations.

[0011] FIG. 5A shows an example of a GUI 500 presenting a custom journey that has been automatically generated for a user, in accordance with some implementations.

[0012] FIG. 5B shows an example of a GUI 530 presented after the user has initiated the custom journey of FIG. 5A, in accordance with some implementations.

[0013] FIG. 5C shows an example of a GUI 560 presenting a second portion of the custom journey, in accordance with some implementations.

[0014] FIG. 5D shows an example of a GUI 580 presenting a user feed, in accordance with some implementations.

[0015] FIG. 6A shows an example of a GUI illustrating a user profile page 600, in accordance with some implementations.

[0016] FIG. 6B shows an example of a GUI 640 presenting a second portion of user profile page 600, in accordance with some implementations.

[0017] FIG. 7 shows an example of a method 700 for generating a custom journey, in accordance with some implementations.

[0018] FIG. 8A shows a block diagram of an example of an environment 10 in which an on-demand database service can be used in accordance with some implementations.

[0019] FIG. 8B shows a block diagram of an example of some implementations of elements of FIG. 8A and various possible interconnections between these elements.

[0020] FIG. 9A shows a system diagram of an example of architectural components of an on-demand database service environment 900, in accordance with some implementations.

[0021] FIG. 9B shows a system diagram further illustrating an example of architectural components of an on-demand database service environment, in accordance with some implementations.

DETAILED DESCRIPTION

[0022] Examples of systems, apparatus, methods and computer program products according to the disclosed implementations are described in this section. These examples are being provided solely to add context and aid in the understanding of the disclosed implementations. It will thus be apparent to one skilled in the art that implementations may be practiced without some or all of these specific details. In other instances, certain operations have not been described in detail to avoid unnecessarily obscuring implementations. Other applications are possible, such that the following examples should not be taken as definitive or limiting either in scope or setting.

[0023] In the following detailed description, references are made to the accompanying drawings, which form a part of the description and in which are shown, by way of illustration, specific implementations. Although these implementations are described in sufficient detail to enable one skilled in the art to practice the disclosed implementations, it is understood that these examples are not limiting, such that

other implementations may be used and changes may be made without departing from their spirit and scope. For example, the operations of methods shown and described herein are not necessarily performed in the order indicated. It should also be understood that the methods may include more or fewer operations than are indicated. In some implementations, operations described herein as separate operations may be combined. Conversely, what may be described herein as a single operation may be implemented in multiple operations.

[0024] Some implementations of the disclosed systems, apparatus, methods and computer program products are configured for generating custom courses for users. A custom course represents a recommended journey that the user can take to achieve their personal goal(s). A user's goal can include, for example, acquiring a new skill set, entering a career, acquiring a particular business role or job position, or earning a specific credential or certification.

[0025] Electronic learning (eLearning) is used in a variety of systems, organizations, and contexts. Typically, online courses are static and designed for a variety of purposes such as certifications, degrees, or credentials. These can be particularly valuable to individuals since they can be accessed from any location. However, there are a number of drawbacks to conventional courses.

[0026] Since courses are generally made accessible to a large population of individuals, those who access the courses may have varying degrees of knowledge and experience. Often, courses are designed for individuals having a minimal level of experience and knowledge. In some instances, the courses are designed with the assumption that individuals have specific knowledge or experience. Unfortunately, those who choose to access a course may not have the requisite knowledge or experience to fully benefit from that course. On the other hand, some users may already possess pertinent knowledge or experience, resulting in them spending hours on material unnecessarily. Due to the limitations of existing courses, users may become frustrated and choose not to complete these courses.

[0027] In accordance with various implementations, a personalized course can be generated in real-time based upon a user's personal characteristics. The course may be generated based upon a user's goals, which may be user defined by answering a series of onboarding questions. These questions can pertain to the user's goal, as well as the user's existing knowledge base. Alternatively, the user's goals can be ascertained by the system automatically based upon implicit acquired user data and/or user provided characteristics.

[0028] A custom course may be presented in the form of a list of content items that each identifies a corresponding action that the user can complete. The list of content items represents a recommended course of action or journey that the user can take to achieve their personal goal. The user's progress toward completing their custom course/journey is trackable, enabling the user to track their progress. In addition, the user's progress may be trackable by other individuals such as prospective employers. Therefore, custom courses and associated tracking can be an invaluable tool for users to increase their skill set and advance their careers.

[0029] In accordance with various implementations, the custom course is generated, provided for display by a client device, and tracked via a web site that also provides a

number of services including eLearning. The list of content items can represent course items corresponding to actions that the user that can perform to complete the respective course items. The custom course or a portion thereof can be completed via the web site through interaction with the custom course. Once a course item is completed, the system may automatically mark its completion within the list. In some implementations, for a content item type/course item type such as an off-site course, the user may mark the item as completed by interacting with a representation of the course item or associated user interface object within the displayed list.

[0030] The user's progress toward completion of a custom course can be tracked within the list itself. In addition, the user's progress with respect to the custom course can be tracked within a user's profile page. For example, the list and/or profile page may indicate the percentage of the course item that has been completed, as well as whether the course item has been initiated or completed. Other information and/or statistics pertaining to the user's acquired skills, credentials, certificates, other achievements, and/or user characteristics may also be presented within the user's profile page.

[0031] While eLearning courses are typically limited to providing learning content and assessment, a user's custom course can include content items representing any number of actions and/or types of actions that the user can take to achieve their goals. For example, content items can identify and/or facilitate access to learning content and associated learning assessments that assess a user's knowledge of the learning content, on-site or off-site courses, recommendations pertaining to credentials or certifications, a recommended job position, a recommended career, a group that is accessible via the web site and recommended for the user to join, a recommendation to follow a particular user via the web site, and/or a topic that is recommended for the user to follow via the web site. Therefore, a user may complete course items by performing various actions online via the web site, online via other web sites, or offline at corresponding venues.

[0032] In some implementations, a user may access and/or complete an individual course item by clicking on a corresponding user interface object rendered in association with a content item within the content list. For example, the user may initiate or resume a corresponding online learning course. As another example, a user may join a group, submit a resume for a recommended job, or follow a user or topic.

[0033] In some implementations, custom online course generation may be facilitated through machine learning. For example, a machine learning algorithm may generate a machine learning model based upon characteristics of other users who have reached the user's goal. The machine learning model may then be applied to the user characteristics to generate the custom online course. The machine learning model may be updated based upon additional user data gathered as users access their custom online courses and/or other system resources.

[0034] In some implementations, assessment of a user's knowledge of learning content is facilitated through different types of assessments such as programmatic/technical, simulations, fill in the blank, peer review, mix and match, etc. An assessment can include one or more assessment tasks of various assessment types. In some implementations, an assessment may validate hands-on work completed in simu-

lations of real-world environments to assess skills competencies that may have been learned via an eLearning platform.

[0035] By way of illustration, John is a new employee at an organization, Pyramid Construction, Inc. John accesses the organization's web site and completes a series of onboarding questions. In his completion of the onboarding questions, John indicates that he is currently in the role of junior administrator, has one year of experience, and his goal is to become a senior administrator. Based upon John's answers and other information the system has collected for John, the system generates a custom course for John and the custom course is rendered in the form of a list of content items that each represents an individual course item. The system saves the custom course in association with John so that John can access the custom course.

[0036] The first course item identifies a course "Pyramid beginner administrator skill set." John accesses a corresponding online learning course by clicking on a button rendered next to the corresponding content item within the list to initiate the course. John stops to get lunch and chooses not to resume the custom course until the next day.

[0037] John returns the next day and finds that the list indicates that he has completed 22% of the "Beginner's administrator skill set course." He clicks on a Resume button next to the corresponding content item in the list and completes the skill set course. The system then automatically marks the skill set course as completed within the list and on John's user profile page.

[0038] Over the next several months, John completes the remaining custom course items including joining a Pyramid administrator group, attending an off-site Administrator course, and completing an advanced administrator skill set course. Upon completion of the custom course, his profile page is updated to indicate that he has completed his custom senior administrator course and has been awarded a senior administrator certificate. A manager in another department visits his profile page and finds that he has completed his custom senior administrator course and awarded a senior administrator certificate, and contacts him for an open position as a senior administrator. John is then hired for the position.

[0039] John is excited about his new job and tells his friend George, who would also like to be hired as a senior administrator. George completes the same onboarding questions but indicates that he has six years' experience in an administrator role. His custom course identifies a "Senior administrator skill set module" but does not include the beginner administrator skill set course.

[0040] George clicks on a button rendered in association with the course item "Pyramid senior administrator skill set" and completes an associated "Senior administrator assessment" to start the assessment. The system provides the "Pyramid senior administrator skill set" and associated assessment via an eLearning platform that enables employees of the organization to complete learning assessment tasks within the context of the organization. As George completes hands-on learning assessment tasks within the context of Pyramid's system, the system accesses and updates database records that a senior administrator employee of the organization would typically encounter during their day-to-day tasks. As George completes the learning assessment tasks, his knowledge is assessed based upon the accuracy with which the tasks are completed.

George completes the assessment and is awarded a senior administrator certificate. The system automatically adds this certificate to George's profile page. George is then hired as a senior administrator within Pyramid.

[0041] Through the completion of personalized system-generated courses, users can gain valuable skills, as well as earn certificates, credentials, badges, and/or points. Since users have different characteristics and skill sets, custom system-generated courses for users having the same goal can vary dramatically while enabling the users to achieve their goal. Automated custom course generation can motivate users to advance their careers with minimal frustration due to inappropriate course content. Moreover, since the system can automatically maintain a record of user progress with respect to custom courses and associated achievements for access by other individuals via a web site, users can achieve their goals without performing traditional processes such as the time-consuming and tedious process of resume generation.

[0042] FIG. 1 shows a system diagram of an example of a database system **100** in which automated course generation and trackable achievements may be implemented, in accordance with some implementations. Database system **102** includes a variety of different hardware and/or software components that are in communication with each other. In the non-limiting example of FIG. 1, system **102** includes any number of computing devices such as servers **104**. Servers **104** are in communication with one or more storage mediums **106** configured to store and maintain relevant data and/or metadata used to perform some of the techniques disclosed herein. System **102** also includes custom course generation and achievement tracking system **108** that enables custom courses to be generated and associated user achievements to be tracked, as described in further detail below.

[0043] Storage mediums **106** can store custom generated courses and information tracking user achievements in relation to custom generated courses. Storage mediums **106** can also include at least one database for storing user information such as user profiles or user account information associated with users of system **102**, as well as database records such as customer relationship management (CRM) records, as described in further detail below. Storage mediums **106** may further store computer-readable instructions configured to perform some of the techniques described herein.

[0044] Information stored in a user account or profile of a user can include a user email address and credentials of the user. For example, credentials of the user can include a username and password. The information can also include the name of the user. In addition, the information can indicate job-related information such as a job title, level, amount of experience, and/or role of the user, as well as associated permissions.

[0045] Client devices **126, 128, 130** may be in communication with system **102** via network **110**. More particularly, client devices **126, 128, 130** may communicate with servers **104** via network **110** through platform **112**. For example, network **110** can be the Internet. In another example, network **110** comprises one or more local area networks (LAN) in communication with one or more wide area networks (WAN) such as the Internet. Embodiments described herein are often implemented in a cloud computing environment, in which network **110**, servers **104**, and possible additional

apparatus and systems such as multi-tenant databases may all be considered part of the “cloud.” Servers **104** may be associated with a network domain, such as `www.salesforce.com` and may be controlled by a data provider associated with the network domain.

[0046] Users **120**, **122**, **124** of client devices **126**, **128**, **130** can include different users corresponding to a variety of roles and/or permissions. In this example, customer user **120** of client computing device **126** may have an account at `salesforce.com`. By logging into this account, the user can access services offered to customers. In other instances, customer user **120** does not have an account at `salesforce.com`. Employee user **122** may log into their account via client computing device **128** and access the various services provided by servers **104** to employees. For example, employee **122** may be a sales employee that accesses customer account records throughout their day as they interact with customers. User **124** can be any user and need not be an employee or customer. In some implementations, user **124** need not have an account at `salesforce.com`. Examples of devices used by users include, but are not limited to a desktop computer or portable electronic device such as a smartphone, a tablet, a laptop, a wearable device such as Google Glass®, another optical head-mounted display (OHMD) device, a smart watch, etc.

[0047] Services described herein may be offered by the data provider to various different types of users such as those having accounts with the data provider. For example, custom course generation and/or achievement tracking services may be provided to customer user **120**, employee user **122**, and/or user **124**. In some implementations, custom course generation may be offered without associated achievement tracking services. In some implementations, users **120**, **122**, **124** of client devices **126**, **128**, **130** can access services via platform **112** or an application installed on client devices **126**, **128**, **130**. More particularly, client devices **126**, **128** can log into system **102** via an application programming interface (API) or via a graphical user interface (GUI) using credentials of corresponding users **120**, **122**, **124** respectively.

[0048] In accordance with various implementations, system **102** includes an electronic learning (eLearning) system **130** that provides eLearning services, enabling users to learn new skills, earn credentials or certificates, and earn visual awards such as badges or superbadges that represent demonstrated achievement around real world use cases. eLearning services can include system generated custom courses, as well as manually generated or submitted courses. Users can access their system generated custom courses via platform **112**. Custom courses can include a lists of content items such as eLearning resources, as well as additional items, as will be described in further detail below.

[0049] eLearning resources can include information that users can read, as well as hands-on tasks and assessments that a user can complete. As described above, a user’s knowledge may be assessed based upon their answers to the assessments. Custom course generation and achievement tracking system **108** may track the user’s completion of items within their custom course, as well as the success with which the user completes the course items. Success can include an amount of progress, as well as accuracy of completion of various course items. During completion of an assessment, a user may perform one or more hands-on assessment tasks within the context of an organization with

which they are familiar. Assessment tasks may include, for example, writing a segment of computer code, modifying data within a data record, or generating a new data record. An assessment environment corresponding to the organization may have an associated database that replicates data maintained by the organization, as well as the hierarchical structure of the data maintained by the organization. For example, data associated with an insurance company may include customer data, account data, and insurance plan data.

[0050] In some implementations, eLearning resources including assessments are presented in the form of learning paths within the context of a game. Learning paths may be organized in chronological order in which they are to be completed by users. Upon successful completion of an assessment task, the user may be presented a corresponding message via a display of their device. System **108** may award a user points or badges that signify the successful completion of an assessment, learning path, or custom course. The user’s achievements may be tracked via a graphical user interface (GUI) that can be accessed by the user and/or other individuals, as will be described in further detail below. In some implementations, the user’s achievements may be tracked via a profile web page associated with the user.

[0051] In some implementations, system **102** further includes community system **132** that provides social networking services. Social networking services can include, but are not limited to, dedicated user profile web pages, social networking feeds, and subject-specific web pages. A subject-specific web page can include, for example, a topic web page, group web page, or an eLearning-specific web page. eLearning-specific web pages may include web pages that are dedicated to independent learning courses, modules, assessments, and/or specific questions within an assessment. Users may access content pertaining to a particular subject via subject-specific web pages. In addition, users may post comments, questions, and/or answers via subject-specific web pages. Subject-specific web pages may provide capabilities such as filtering, sorting, and/or search capabilities, enabling a user to quickly identify subject-specific information that they seek. In addition, social networking services may enable users to submit subscriptions to follow specific subjects (e.g., groups, topics, or learning-specific topics) by submitting a request via the corresponding web page. Social networking services can also include real-time chat capabilities, as well as electronic mail services.

[0052] In some implementations, user data gathered via custom course generation and achievement tracking system **108**, eLearning system **130**, community system **132**, and/or customer relationship management (CRM) system **134** may be processed to obtain user feature values pertaining to various user features. User data may be gathered implicitly based upon users’ interactions with services such as those provided by course generation and achievement tracking system **108**, eLearning system **130**, community system **132**, and/or CRM system **134**, as well as data explicitly provided by users to these systems. For example, user interactions can include ownership of or interactions with database records of CRM system. The user data may include data gathered by the system with respect to various web sites and services. The feature values obtained or derived from the user data may then be analyzed and applied according to various implementations, as described herein. For example, feature

values pertaining to user features may be processed via machine learning algorithm(s). Machine learning models that are generated using machine learning algorithms may be applied to facilitate processes performed by any of systems 108, 130, 132, 134, as will be described in further detail below.

[0053] In this example, systems 108, 130, 132, 134 are represented independently. However, it is important to note that systems 108, 130, 132, 134 represent functional aspects of system 102. Therefore, any of systems 108, 130, 132, 134 may be implemented separately or in combination with one another in an integrated system.

[0054] Data associated with systems 108, 130, 132, 134 may be stored independently or in combination in data stores 104. Systems 108, 130, 132, 134 can communicate with one another to obtain user data or feature values via various communication mechanisms such as Application Programming Interfaces (APIs).

[0055] In some implementations, custom course generation and achievement tracking system 108 identifies a list of content items for use in generating a custom course for a user and transmits the list via an API to eLearning system 130, which generates the custom course using the list of content items. eLearning system 130 or custom course generation and achievement tracking system 108 can assign the custom course to the user. In some implementations, custom course generation and achievement tracking system 108 is integrated with community system 132 or eLearning system 130.

[0056] In some implementations, a user of platform 112 may have a single authorization identity. In other implementations, a user of platform 112 may have two or more different authorization identities, which can be associated with any of systems 108, 130, 132, 134. This can allow multiple modes of access to systems and associated services, which can be based on private authorization or public authorization. For example, one authorization identity can be a set of access credentials based on a profile of a CRM system 134. The other authorization identity can be a set of access credentials associated with an eLearning platform of system 102 that provides access to eLearning resources via eLearning system 130. In some implementations, platform 112 can query the set of access credentials from CRM system 134 and map those credentials and/or permissions with credentials associated with eLearning system 130.

[0057] Typically, a user maintains multiple identities that enable the user to login separately to various services and systems. In the example of FIG. 1, a user would have different sets of credentials to access eLearning system 130 and Community system 132. Unfortunately, this can result in an out-of-sync and disjointed experience.

[0058] In accordance with various implementations, a user may access features including those offered by eLearning system 130 and Community system 132 using a single identity and corresponding login. For example, the user may connect their multiple login credentials to a single identity. By logging in to a single account, the user may access features including social media features, e-learning features, and CRM records. Using a single profile, the user may access a personalized journey or feed that includes content items identified using information obtained from or generated by multiple sources such as eLearning system 130 and Community system 132, as will be described in further detail below.

[0059] In some implementations, a custom computer-generated list of content items/course items including educational resources is automatically generated based, at least in part, on the goal and other user characteristics/feature values of the user, as well user characteristics/feature values of other users of system 102. A user's goal can include a particular career, a particular business role, a particular job position, a particular set of one or more skills, a particular credential, or a particular certification. In some instances, user characteristics/feature values can indicate those course items or corresponding actions the user has already completed.

[0060] In some implementations, data stores 106 maintain course item feature metadata associated with online resources and/or course items, where the course item feature metadata indicates feature values corresponding to content item/course item features. Content item/course item features can include, but are not limited to, content item/course item type (e.g., learning, topic, group, follower, off-line course, etc.) and/or pertinent user features. A computer-generated course may be generated further based, at least in part, on course item feature metadata for content items/course items that have been completed, as well as available content items/course items.

[0061] In some implementations, the system may ask the user a set of questions and use the user's answers to generate and provide a custom course. As will be described in further detail below with reference to FIGS. 2-4, the system may provide a set of "onboarding questions" pertaining to the user's goal and the user's answers can be used to automatically generate a custom course for the user that will help the user to achieve their goal. Goals may generally pertain to the user's career or more specifically to the organization.

[0062] FIG. 2 shows an example of a graphical user interface (GUI) 200 configured to obtain a user's goal, in accordance with some implementations. For example, the user may be asked where they would like to begin their journey. In response, the user may indicate that their goal is to kickstart their career, learn specific skills, or earn credentials. The credentials may include those that are specific to their organization. For example, the credentials may be designed to teach the user a specific skill that will be applied within the context of the organization.

[0063] In some implementations, the user may also indicate that they are not quite sure of their goals. The system may use feature data pertaining to the user and/or other users of the system to automatically select one or more goals for the user. The system may provide the computer-generated goals for display at a client device for user selection or, alternatively, the system may implement these system-generated goals during the course/journey generation process. The system may then store an indication of the goal in association with the user.

[0064] A user may select goal(s) from a plurality of user-selectable options represented in GUI 200 by corresponding user interface objects. In other implementations, the user may explicitly specify a goal or goal-related information. A user's goal may be further defined using additional information such as the user's role and/or level of experience. Examples of GUIs that can be used to further define a user's goal will be discussed in further detail below with reference to FIGS. 3 and 4.

[0065] FIG. 3 shows an example of a GUI 300 configured to further ascertain a user's role, in accordance with some

implementations. GUI 300 prompts the user to submit further information defining the user's goal. In this example, the system prompts the user to pick a role. The user then submits input indicating their desired role. For example, their desired goal may include a specific job title, career, or certification. In other words, the selection by the user of a role may further define the user's goal. In this example, the user has selected "Salesforce Administrator." In some implementations, the user may also be asked to select a set of topics in which they are interested. These topics can correspond to subject-specific web pages.

[0066] FIG. 4 shows an example of a GUI 300 configured to ascertain a user's level of experience, in accordance with some implementations. As shown in this example, the user may be asked to provide a level of experience (e.g., number of years) with respect to their desired goal or role. In this example, the user has indicated that they have between 0 and 1 year of experience.

[0067] A custom system-generated course or feed may be generated based, at least in part, on the user's goals and other features specific to the user. The system can intelligently generate custom courses or feeds that include items that are most likely to be pertinent to the user and their goals. Thus, the user no longer needs to search multiple sites to find what they need to pursue their goals. In addition, the system may provide a custom course or feed when it will be most likely to benefit the user.

[0068] Typically, the user's experience is disjointed across different systems, system services, and system features. As will be described in further detail below, the system may generate a custom course or feed for a particular user. The course or feed may be provided for presentation via a web page such as a home page or user profile page. By integrating eLearning features and social media features, the system can facilitate user connections and expand the user's opportunities for reaching their goals. Through a single web site, the system integrates eLearning and social networking to facilitate the career advancement of users through custom courses and feeds.

[0069] FIG. 5A shows an example of a GUI 500 presenting a custom journey that has been automatically generated for a user, in accordance with some implementations. As shown in this example, the system may provide a user interface object representing a custom course/journey 502, "Become a Salesforce Administrator," for display via a home page. Specifically, the system provides a user interface object 504 for display within GUI 500 that enables a user to start their progress in their custom course/journey 502.

[0070] In this example, the user clicks on the "Start" button to begin custom course 502. The user is then presented their custom course.

[0071] In addition, the system may provide a custom feed 504 that includes information or content items that are relevant to the user's goal or other user characteristics. In this example, feed 504 includes content items representing new learning modules that may pertain to the user's goal.

[0072] The user begins their custom course/journey by clicking on user interface object 504. Their custom course/journey is then provided for presentation to the user via a client device.

[0073] In some implementations, a custom course operates in a similar manner to a syllabus or curriculum. However, a custom course is not limited to educational topics or units.

Rather, the custom course can identify specific actions that the user should take to achieve a particular goal.

[0074] FIGS. 5B and 5C together illustrate an example of a custom journey that can be system generated in accordance various implementations. FIG. 5B shows an example of a GUI 530 presented after the user has initiated the custom course identified in FIG. 5A, in accordance with some implementations. The system may provide the custom course in the form of a list of content items for presentation on a user's home page or profile page. Each of these content items can identify or correspond to a particular action that is to be taken by the user.

[0075] In this example, the content items correspond to a custom path/journey toward becoming an administrator. In this example, the custom courses are represented by a plurality of user interface elements that each corresponds to a different content item. As shown in FIG. 5B, each user interface element can include a corresponding segment of the web page. For example, the segment of the web page can include a horizontal portion of the web page. Content items 532 can include recommended groups, topics, users to follow, recommended mentors, and/or recommended mentees. In some implementations, the order in which the content items are listed represents the recommended order in which the actions should be completed by the user. However, the user may choose to complete the actions in a different order from that in which the content items are presented to the user via a client device.

[0076] An individual user interface element representing a content item may have an associated user interface object with which the user can interact to perform an action represented by the content item. For example, the user may click on a button to join a group or follow a topic. As another example, the user may start or resume a learning module or learning trail by interacting with a corresponding user interface object. In response, the system may provide access to a corresponding web page via a hypertext link or other mechanism. The user may be rewarded a specific number of points for completing various actions, as indicated in the respective user interface elements.

[0077] As the user scrolls down to view further content items in the custom course, additional user interface elements representing various content items such as learning modules, learning trails (e.g., paths or sequences), links, badges, superbages, and masterbadges can be displayed, as shown in FIG. 5C. In some implementations, badges, superbages, and masterbadges may be awarded after the user has successfully completed a sequence of learning modules or hands-on tasks that teach and assess the user's skills and knowledge in a real-world environment using data relevant to the organization. A badge, superbage, or masterbadge can represent a certification or credential such as Data Integration Specialist.

[0078] The user's achievements may be tracked in association with the user, as well as represented visually within the content list of the custom course. Upon successful completion of a corresponding action, an indication of the successful completion may be represented within or in close proximity to the user interface element.

[0079] It is important to note that the examples described herein are merely illustrative and the number and types of content items/course items that can be presented in a computer-generated custom course may be unlimited. Moreover,

since a custom course is generated for a specific user, the number and types of content items will typically vary from user to user.

[0080] For example, the content items can also include a recommended onsite or off-site learning course or event. The user may register with a recommended course or event by interacting with a corresponding user interface object such as a “Register” button. The user may similarly interact with user interface objects to start recommended learning modules/paths or resume in-progress learning modules/paths. For content items such as those pertaining to learning modules or sequences, an estimated time that it will take the user to complete can be displayed in the corresponding user interface element. The user can scroll up or down to view content items within their custom course. For in-progress learning modules, a percentage of completion by the user of the corresponding learning modules can be presented in the corresponding user interface element.

[0081] FIG. 5D shows an example of a GUI **580** presenting a user feed, in accordance with some implementations. After the user logs in, the user can view a list of personalized content items in a feed, which can be presented via the user’s home page or profile. In this example, the feed includes a content item representing the custom course **502** for becoming a Salesforce administrator.

[0082] As discussed above, a custom course including a list of content items may represent a recommended path toward achieving the user’s goals. The recommended path can include a recommended sequence of actions that the user can take toward achieving the user’s career goals. In this example, the recommended path is a “To-Do List” including a sequence of events that are recommended for becoming a Salesforce Administrator. The user can interact with an associated user interface object/component **504** such as a button to start or resume their custom course and progress along the recommended path. A custom course such as that described above with reference to FIGS. 5B and 5C may then be presented via web page(s) rendered on a display of a client device.

[0083] Content items can further include user interface elements representing learning content such as in-progress learning modules or trails/sequences that are not identified in the user’s custom course. In this example, content items identifying two in-progress modules, Trailhead Basics and Trailhead Playground Management, are represented by corresponding user interface elements. A user may interact with an associated user interface object to start or resume the corresponding learning module/trail, as discussed above.

[0084] Content items presented within the user’s feed can also include posts from groups that the user has joined and posts from users that the user is following. In some implementations, the user can configure a set of filters so that the home page shows the type of content items/events that the user is most interested in reading.

[0085] FIG. 6A shows an example of a GUI illustrating a user profile page **600**, in accordance with some implementations. The user’s profile can be accessed via a corresponding Uniform Resource Locator (URL). The URL may be accessed via the public domain unless the user or another individual has configured their profile to be private or accessible according to specific user permission settings.

[0086] In some implementations, the user’s goal may be presented on the user’s profile, enabling potential employers to identify prospective employees for advancement within

the organization. In addition, the user’s profile page **600** can track the user’s progress with respect to custom journeys and associated achievements. The user’s profile page can serve as a valuable tool for both the user and potential employers. As shown in this example, the profile can integrate aspects of eLearning system **130** and Community system **132** of FIG. 1. By integrating the learning system and community system into a single experience, the system provides resources that enable users to reach their full potential within an organization. Since other users may access the user’s profile page, this enables these users to view a quick summary of the user’s knowledge, skills, achievements, experiences, and goals. The profile page can be automatically updated based upon the user’s interactions with database system **102**, which increases the reliability of the user information made available to potential employers. In addition, the user profile can serve as a resume, which increases the likelihood that the user will reach their goals and eliminates the need for a user to prepare a traditional resume. The user profile can include any number of segments. The segments shown in FIG. 6 are merely illustrative, and other types of information can be presented in various combinations within a profile page.

[0087] As shown in this example, a first segment **602** of the profile page is configured to provide information pertaining to the user’s experience with a eLearning system **130** and a second segment **604** of the profile page is configured to provide information pertaining to the user’s experience with Community system **132**. Information rendered within segment **602** pertaining to the learning system can include, for example, the number of badges earned by the user, the number of points earned by the user, and/or the number of learning trails completed by the user. Segment **602** can also indicate next steps that the user can perform to advance within the organization or achieve their goal(s).

[0088] Segment **604** can include information indicating the number of questions submitted by other users of database system **102** that the user has answered, the number of times that the user’s answer is voted as the best answer, the number of questions the user has submitted via database system **102**, the number of ideas the user has submitted via database system **102**, the number of votes the user has received, and/or the number of comments the user has submitted.

[0089] Further segments of the profile page can include skills and achievements and/or recent activity, represented by segments **606** and **608**, respectively. Skills and achievements can include any skill or achievement of the user pertaining to their experience with database system **102**. Skills and achievements can include information pertaining to the user’s progress with respect to a custom course. For example, segment **606** can identify the custom courses the user has completed, the user’s progress toward completion of a custom course, specific skills they have acquired via various learning modules or trails, and/or identifiers of specific learning modules or trails that the user has started and the user’s progress toward completion.

[0090] The user can scroll down to view the remaining segments of the profile page. FIG. 6B shows an example of a GUI **640** presenting a second portion of user profile page **600**, in accordance with some implementations. Segment **642** provides information pertaining to and/or access to a social network of the organization. For example, segment **642** may indicate the number of followers of the user, the

number of other users that the user is following, the number of groups of which the user is a member, and/or the topics that the user is following. Segment 644 may enable the user to access a social network feed via the social network. Segment 646 may identify events that the user attended, as well as the events the user is planning to attend.

[0091] FIG. 7 shows an example of a method 700 for generating a custom journey, in accordance with some implementations. As will be described in further detail below, a custom journey can be dynamically created based, at least in part, on a user's existing skills and knowledge. To generate a custom journey, the system may ascertain a goal of a user of a database system at 702. For example, the user's goal can include a particular career, a particular business role, a particular job position, a particular set of one or more skills, a particular credential, or a particular certification. In some implementations, the system can ascertain a goal of the user based, at least in part, on an indication of user input received from a client device. In other implementations, the system can ascertain a goal of the user based, at least in part, on user feature data of the user stored in at least one database, where the user feature data includes one or more feature values corresponding to one or more user features.

[0092] The user features of a given user of the database system can include, but are not limited to, a history of interaction of the user with database records such as CRM records stored in a database of the database system, a learning module that is accessible via the web site and with which the user has interacted, an amount of progress of the user with respect to a learning module that is accessible via the web site and with which the user has interacted, a learning module that is accessible via the web site and that the user has completed, a sequence of learning modules that is accessible via the web site and with which the user has interacted, a sequence of learning modules that is accessible via the web site and that the user has completed, an amount of progress of the user with respect to a sequence of learning modules that is accessible via the web site, a credential or certification that has been obtained by the user, a current job position, a prior job position, a career, a set of skills, an amount of experience, user goals that have been achieved, a level of progress or completion of a custom course designed to assist the user in achieving a particular one of their user goals, a level of accuracy or success with which user progresses in the custom course, a group that is accessible via the web site and of which the user is a member, a particular user that the user is following via the web site, a particular topic that is being followed by the user via the web site, a topic web page that has been accessed by the user via the web site, and/or a post of the user that has been published via the web site. The user features can further indicate any additional content items or custom course items that have been completed by the user.

[0093] User features can also pertain to questions and/or answers posted by the user via the web site. For example, user features can include a question that has been posted by the user via the web site, an answer that has been posted by the user via the web site in response to a question that has been posted by another user, a number of questions posted by the user via the web site, a number of answers posted by the user via the web site, and/or the number of times the user's answer has been voted as the best answer.

[0094] User features can also include demographics and/or topics the user is interested in. Topics that the user is

interested in can include those that have been explicitly indicated by the user and/or those that have been implicit and derived by the system. Demographics of a user can include, but are not limited to, age, gender, home location, and/or work location.

[0095] The system then identifies users of the database system who have achieved the goal at 704. This can include, for example, accessing user goal information stored in a database of the database system. Specifically, the goal information can include a mapping between user identifiers and user-specific goal(s). For example, the goal information can identify or otherwise indicate user-specific goal(s) for at least a subset of the users of the database system. In some implementations, the system selects a subset of the identified users based upon shared user characteristics/feature values.

[0096] The system obtains, for each of the users, a corresponding plurality of feature values corresponding to a plurality of user features at 706. The feature values may be obtained from user feature information stored in at least one database. In some instances, feature value(s) can be derived based, at least in part, on a history of interaction of the users with the database system. For example, feature values can indicate interactions of users with custom courses, levels of progress or completion of custom courses, and/or whether they reached the goal.

[0097] The system aggregates the feature values for each of the plurality of users such that a set of feature values corresponding to the users is generated at 708. The set of feature values can be stored for retrieval by the system for generation of a custom course.

[0098] The system generates a custom course in an automated fashion. This can alleviate the burden on administrators and other users tasked with educating their employees in an efficient and thorough manner.

[0099] As shown in Figure system, the system generates a custom course including a list of content items for the user based, at least in part, on the set of feature values corresponding to the users and feature values of the user that correspond to the user features at 710. In some implementations, the custom course is generated further based, at least in part, on content item/course item feature values associated with content items/course items. The custom course can be generated in real-time responsive to a user request such as the submission of answers to a set of onboarding questions. The list of content items may be identifiable by one or more data objects stored in a database.

[0100] The system can generate the list of content items based, at least in part, on a dependency tree indicating dependencies among content items/course items such as a plurality of electronic learning resources stored in an electronic learning repository. As described herein, the electronic resources of the electronic learning repository can include learning modules or learning module sequences. The dependency tree can be beneficial for identifying suitable content items to present to the user, as well as the order in which content items are presented.

[0101] In some implementations, the custom course is generated by applying a machine learning algorithm to a training data set including the set of feature values corresponding to the users such that at least one machine learning model is generated. As described above, feature values for a given user can indicate content items/course items completed by the user. In some implementations, the machine learning model is further generated using content item/

course item feature values associated with content items/course items completed by the users. A machine learning model that has been generated can include one or more equations that include a plurality of variables representing user features and course item features, as well as numerical values including coefficients of the equations.

[0102] The list of content items may be generated for the user by applying the machine learning model to the plurality of feature values of the user. The list of content items may be further generated based, at least in part, on course item feature values of the content items/course items completed by the user and/or course item feature values of potential content items/course item(s). For example, the machine learning model may be applied for the user for each potential content item/course item. Those content items/course items having the highest value may be selected for use in generating the user's custom course.

[0103] In some implementations, the system generates the custom course such that it includes a minimum, maximum, and/or specified number of course items having a particular set of course item characteristics (e.g., course item type). For example, the system may generate a custom course such that it includes one recommended group, one recommended topic, and at least one recommended learning module or learning path.

[0104] The system may provide the custom course for display by a client device. In some implementations, the system provides or updates a web page for display by a client device of the user such that the web page includes a plurality of user interface elements representing the list of content items at 712, where each of the user interface elements corresponds to a different one of the plurality of content items. The web page can include, for example, a home page or profile page. Thus, the web page may be associated with the user. At least one content item in the list of content items represents a recommended learning module or a recommended sequence of learning modules. The list can further include one or more additional content items such as a recommended credential or certification, a recommended job position, a recommended career, a link, a group that is accessible via the web site and recommended for the user to join, a recommendation to follow a particular user via the web site, a topic that is recommended for the user to follow via the web site, a recommended event, or a recommended off-site course. At least one of the content items may have an associated user interface object displayable within or in close proximity to the corresponding user interface element.

[0105] In some implementations, the user can interact with content items in the list via corresponding user interface objects. For example, the user may interact with a user interface object to start or resume a corresponding learning module trail; As another example, the user may interact with a user interface object to sign up for an off-site event or course, follow a topic or user, or join a group. For various content item types/event types, the system may enable the user to mark a content item as completed.

[0106] The system tracks the progress of the user toward completion of actions corresponding to the content items in the list of content items at 714. In some implementations, the system tracks the user's progress based, at least in part, on interaction by the user with the list of content items. For example, the system may process an indication of user input representing an interaction by the user with at least one user

interface object of the web page corresponding to one of the content items/user interface elements.

[0107] In some implementations, user interface objects are user-selectable and the user interacts with the user interface object by selecting (e.g., clicking on) the user interface object. User interface objects can include, for example, buttons, tabs, or menus.

[0108] For some content types/event types, responsive to processing an indication of user selection of a user interface object, the system may perform or complete the corresponding action. For example, where the user selects a button to follow another user or join a group, the system may add the user to the group or as a follower to another user. The system can then update, in a database, metadata associated with the custom course to reflect the completed action for that content item.

[0109] For some content item types/course item types, responsive to processing an indication of the user selection of a user interface object corresponding to a particular content item, the system may provide a second web page associated with the particular content item. For example, the system may enable the user to start or resume a learning module or trail. As another example, the second web page can enable the user to sign up for an off-site course. The system may store or update metadata as the user completes the learning module or trail.

[0110] In addition, the system can track the user's progress with respect to individual content items independently from the custom course. For example, the system may track the progress with respect to corresponding learning modules or learning trails independently from the web page and update the list within the web page as the user completes the corresponding learning content. This can be performed, for example, using an Application Programming Interface (API) of a module, trail, or eLearning system. As another example, the user may complete an action corresponding to a particular content item and the system may receive notice of the action's completion via a poll or pull method. This may occur, for example, where a user completes an action outside the context of the web page/list, such as where notification of attendance of an off-site event is received from the creator of the event.

[0111] In some instances, the progress with respect to a particular content item may be tracked automatically. In other instances, such as where an off-site event is identified, the user may submit input via a user interface object to indicate that the action has been completed for the corresponding content item.

[0112] The tracking of the user's progress can also include assessing the user's performance with respect to various content items. For example, the user's performance can be assessed based upon the results of learning assessments that the user has completed or is in the process of completing. The user's performance can be ascertained, for example, via an API of eLearning system 130.

[0113] The system may store or update metadata reflecting the user's progress with respect to the custom course in a data object stored in a database. Similarly, the system may store or update information reflecting the user's progress with respect to individual content items in one or more data objects stored in a database. The system may subsequently update the information to indicate whether the user was successful in reaching their goal after completing a custom learning module or a portion thereof.

[0114] For at least one of the content items in the list, the system provides, in the web page for display by the client device, an indication of progress or completion of the corresponding action by the user according to the progress of the user at 716. For example, the system can provide an indication of whether the action was started or completed. For learning modules and sequences, the system can provide an indication of the amount (e.g., percentage) that has been completed. The system can also provide, in the web page, an indication of the level of the user's performance with respect to the custom course or specific content items. The system may award the user a certificate, credential, degree, badge(s), and/or points upon successfully completing the custom course.

[0115] In some implementations, the system continues to identify further content items that would assist the user in achieving their goal after the custom course has been generated and/or provided for presentation to the user via a client device. More particularly, the system may identify further content items as additional online resources or course items are added to the system and/or as additional user feature data for the user or other users is collected. An additional content item identification process can be performed periodically or in response to a trigger such as the addition of resources or content items to the system and/or collection of additional user feature data for the user or other users is collected.

[0116] In some implementations, a set of rules is applied to determine circumstances in which to add new content items to the custom course, as well as which types of content items/course items to add to the custom course. The set of rules may also be used to determine whether to add a new content item to the custom course or a separate feed. This can prevent endless updates to the user's custom course, which can lead to user frustration.

[0117] For example, if the user's performance with respect to the custom course falls below a threshold level, the custom course can be modified to include additional content item(s). The user's performance may be assessed based, at least in part, on the accuracy of the user's answers to assessments provided by learning modules or learning module sequences identified within their custom course. Additional educational resources such as learning modules or learning module sequences can be identified based upon the user's performance. More particularly, the system can identify learning module(s) or sequences that would help the user gain skills or knowledge that the system determines the user is lacking based upon their answers to assessments. Alternatively, if the user's performance with respect to the custom course exceeds a minimum threshold level, the system may add additional content items to a separate feed.

[0118] The system may generate or update a machine learning model used to identify content items as it gathers new information, either about current users of the system or new users of the system. The system can continue to apply the machine learning model to identify new content items for a given user, as described herein.

[0119] In some implementations, the web page or associated custom course may be published via a network for access by other users. The web page or custom course may also have associated permissions that govern whether the web page is published or otherwise accessible by other users, either within the organization or outside the organization. The permissions may indicate a particular set of

individuals who are permitted to access the web page or custom course. The permissions associated with the custom course or web page may be configurable by the user and/or other individual(s) such as the user's manager or supervisor to limit accessibility to the web page.

[0120] In some implementations, aspects of the user's progress or completion of the custom course may be provided for display in another web page such as the user's profile page. For example, the profile page may indicate a level of progress toward completion of the course, as well as any certification, credential, degree, badge(s), or points awarded upon completion of the course. As another example, the profile page may indicate skills that have been acquired by the user upon completion of a custom course or individual custom course item. The profile page may be published via a network for access by individuals within the organization, individuals outside the organization, and/or a particular set of individuals. The profile page may have associated permissions that govern whether the profile is published or otherwise accessible, as well as govern which individuals may access the profile page. The permissions associated with the profile page may be configurable by the user.

[0121] The above-described examples refer to the presentation of a custom course via a web page of a web site. However, these examples are merely illustrative. Custom courses can also be generated for presentation via a mobile application installed on a mobile device. Moreover, while a custom course can be generated for a single user, a custom course can also be generated for a class of users having the same goal and shared characteristics.

[0122] Some but not all of the techniques described or referenced herein are implemented using or in conjunction with a social networking system. Social networking systems have become a popular way to facilitate communication among people, any of whom can be recognized as users of a social networking system. One example of a social networking system is Chatter®, provided by salesforce.com, inc. of San Francisco, Calif. salesforce.com, inc. is a provider of social networking services, CRM services and other database management services, any of which can be accessed and used in conjunction with the techniques disclosed herein in some implementations. In some but not all implementations, these various services can be provided in a cloud computing environment, for example, in the context of a multi-tenant database system. Thus, the disclosed techniques can be implemented without having to install software locally, that is, on computing devices of users interacting with services available through the cloud. While the disclosed implementations are often described with reference to Chatter®, those skilled in the art should understand that the disclosed techniques are neither limited to Chatter® nor to any other services and systems provided by salesforce.com, inc. and can be implemented in the context of various other database systems and/or social networking systems such as Facebook®, LinkedIn®, Twitter®, Google+, Yammer® and Jive® by way of example only.

[0123] Some social networking systems can be implemented in various settings, including organizations. For instance, a social networking system can be implemented to connect users within an enterprise such as a company or business partnership, or a group of users within such an organization. For instance, Chatter® can be used by employee users in a division of a business organization to

share data, communicate, and collaborate with each other for various social purposes often involving the business of the organization. In the example of a multi-tenant database system, each organization or group within the organization can be a respective tenant of the system, as described in greater detail below.

[0124] In some social networking systems, users can access one or more social network feeds, which include information updates presented as items or entries in the feed. Such a feed item can include a single information update or a collection of individual information updates. A feed item can include various types of data including character-based data, audio data, image data and/or video data. A social network feed can be displayed in a graphical user interface (GUI) on a display device such as the display of a computing device as described below. The information updates can include various social network data from various sources and can be stored in a database system. In some but not all implementations, the disclosed methods, apparatus, systems, and computer program products may be configured or designed for use in a multi-tenant database environment.

[0125] In some implementations, a social networking system may allow a user to follow data objects in the form of CRM records such as cases, accounts, or opportunities, in addition to following individual users and groups of users. The “following” of a record stored in a database, as described in greater detail below, allows a user to track the progress of that record when the user is subscribed to the record. Updates to the record, also referred to herein as changes to the record, are one type of information update that can occur and be noted on a social network feed such as a record feed or a news feed of a user subscribed to the record. Examples of record updates include field changes in the record, updates to the status of a record, as well as the creation of the record itself. Some records are publicly accessible, such that any user can follow the record, while other records are private, for which appropriate security clearance/permissions are a prerequisite to a user following the record.

[0126] Information updates can include various types of updates, which may or may not be linked with a particular record. For example, information updates can be social media messages submitted by a user or can be otherwise generated in response to user actions or in response to events. Examples of social media messages include: posts, comments, indications of a user’s personal preferences such as “likes” and “dislikes”, updates to a user’s status, uploaded files, and user-submitted hyperlinks to social network data or other network data such as various documents and/or web pages on the Internet. Posts can include alpha-numeric or other character-based user inputs such as words, phrases, statements, questions, emotional expressions, and/or symbols. Comments generally refer to responses to posts or to other information updates, such as words, phrases, statements, answers, questions, and reactionary emotional expressions and/or symbols. Multimedia data can be included in, linked with, or attached to a post or comment. For example, a post can include textual statements in combination with a JPEG image or animated image. A like or dislike can be submitted in response to a particular post or comment. Examples of uploaded files include presentations, documents, multimedia files, and the like.

[0127] Users can follow a record by subscribing to the record, as mentioned above. Users can also follow other

entities such as other types of data objects, other users, and groups of users. Feed tracked updates regarding such entities are one type of information update that can be received and included in the user’s news feed. Any number of users can follow a particular entity and thus view information updates pertaining to that entity on the users’ respective news feeds. In some social networks, users may follow each other by establishing connections with each other, sometimes referred to as “friending” one another. By establishing such a connection, one user may be able to see information generated by, generated about, or otherwise associated with another user. For instance, a first user may be able to see information posted by a second user to the second user’s personal social network page. One implementation of such a personal social network page is a user’s profile page, for example, in the form of a web page representing the user’s profile. In one example, when the first user is following the second user, the first user’s news feed can receive a post from the second user submitted to the second user’s profile feed. A user’s profile feed is also referred to herein as the user’s “wall,” which is one example of a social network feed displayed on the user’s profile page.

[0128] In some implementations, a social network feed may be specific to a group of users of a social networking system. For instance, a group of users may publish a feed. Members of the group may view and post to this group feed in accordance with a permissions configuration for the feed and the group. Information updates in a group context can also include changes to group status information.

[0129] In some implementations, when data such as posts or comments input from one or more users are submitted to a social network feed for a particular user, group, object, or other construct within a social networking system, an email notification or other type of network communication may be transmitted to all users following the user, group, or object in addition to the inclusion of the data as a feed item in one or more feeds, such as a user’s profile feed, a news feed, or a record feed. In some social networking systems, the occurrence of such a notification is limited to the first instance of a published input, which may form part of a larger conversation. For instance, a notification may be transmitted for an initial post, but not for comments on the post. In some other implementations, a separate notification is transmitted for each such information update.

[0130] The term “multi-tenant database system” generally refers to those systems in which various elements of hardware and/or software of a database system may be shared by one or more customers. For example, a given application server may simultaneously process requests for a great number of customers, and a given database table may store rows of data such as feed items for a potentially much greater number of customers.

[0131] An example of a “user profile” or “user’s profile” is a database object or set of objects configured to store and maintain data about a given user of a social networking system and/or database system. The data can include general information, such as name, title, phone number, a photo, a biographical summary, and a status, e.g., text describing what the user is currently doing. As mentioned below, the data can include social media messages created by other users. Where there are multiple tenants, a user is typically associated with a particular tenant. For example, a user could be a salesperson of a company, which is a tenant of the database system that provides a database service.

[0132] The term “record” generally refers to a data entity having fields with values and stored in database system. An example of a record is an instance of a data object created by a user of the database service, for example, in the form of a CRM record about a particular (actual or potential) business relationship or project. The record can have a data structure defined by the database service (a standard object) or defined by a user (custom object). For example, a record can be for a business partner or potential business partner (e.g., a client, vendor, distributor, etc.) of the user, and can include information describing an entire company, subsidiaries, or contacts at the company. As another example, a record can be a project that the user is working on, such as an opportunity (e.g., a possible sale) with an existing partner, or a project that the user is trying to get. In one implementation of a multi-tenant database system, each record for the tenants has a unique identifier stored in a common table. A record has data fields that are defined by the structure of the object (e.g., fields of certain data types and purposes). A record can also have custom fields defined by a user. A field can be another record or include links thereto, thereby providing a parent-child relationship between the records.

[0133] The terms “social network feed” and “feed” are used interchangeably herein and generally refer to a combination (e.g., a list) of feed items or entries with various types of information and data. Such feed items can be stored and maintained in one or more database tables, e.g., as rows in the table(s), that can be accessed to retrieve relevant information to be presented as part of a displayed feed. The term “feed item” (or feed element) generally refers to an item of information, which can be presented in the feed such as a post submitted by a user. Feed items of information about a user can be presented in a user’s profile feed of the database, while feed items of information about a record can be presented in a record feed in the database, by way of example. A profile feed and a record feed are examples of different types of social network feeds. A second user following a first user and a record can receive the feed items associated with the first user and the record for display in the second user’s news feed, which is another type of social network feed. In some implementations, the feed items from any number of followed users and records can be combined into a single social network feed of a particular user.

[0134] As examples, a feed item can be a social media message, such as a user-generated post of text data, and a feed tracked update to a record or profile, such as a change to a field of the record. Feed tracked updates are described in greater detail below. A feed can be a combination of social media messages and feed tracked updates. Social media messages include text created by a user, and may include other data as well. Examples of social media messages include posts, user status updates, and comments. Social media messages can be created for a user’s profile or for a record. Posts can be created by various users, potentially any user, although some restrictions can be applied. As an example, posts can be made to a wall section of a user’s profile page (which can include a number of recent posts) or a section of a record that includes multiple posts. The posts can be organized in chronological order when displayed in a GUI, for instance, on the user’s profile page, as part of the user’s profile feed. In contrast to a post, a user status update changes a status of a user and can be made by that user or an administrator. A record can also have a status, the update of which can be provided by an owner of the record or other

users having suitable write access permissions to the record. The owner can be a single user, multiple users, or a group.

[0135] In some implementations, a comment can be made on any feed item. In some implementations, comments are organized as a list explicitly tied to a particular feed tracked update, post, or status update. In some implementations, comments may not be listed in the first layer (in a hierarchical sense) of feed items, but listed as a second layer branching from a particular first layer feed item.

[0136] A “feed tracked update,” also referred to herein as a “feed update,” is one type of information update and generally refers to data representing an event. A feed tracked update can include text generated by the database system in response to the event, to be provided as one or more feed items for possible inclusion in one or more feeds. In one implementation, the data can initially be stored, and then the database system can later use the data to create text for describing the event. Both the data and/or the text can be a feed tracked update, as used herein. In various implementations, an event can be an update of a record and/or can be triggered by a specific action by a user. Which actions trigger an event can be configurable. Which events have feed tracked updates created and which feed updates are sent to which users can also be configurable. Social media messages and other types of feed updates can be stored as a field or child object of the record. For example, the feed can be stored as a child object of the record.

[0137] A “group” is generally a collection of users. In some implementations, the group may be defined as users with a same or similar attribute, or by membership. In some implementations, a “group feed”, also referred to herein as a “group news feed”, includes one or more feed items about any user in the group. In some implementations, the group feed also includes information updates and other feed items that are about the group as a whole, the group’s purpose, the group’s description, and group records and other objects stored in association with the group. Threads of information updates including group record updates and social media messages, such as posts, comments, likes, etc., can define group conversations and change over time.

[0138] An “entity feed” or “record feed” generally refers to a feed of feed items about a particular record in the database. Such feed items can include feed tracked updates about changes to the record and posts made by users about the record. An entity feed can be composed of any type of feed item. Such a feed can be displayed on a page such as a web page associated with the record, e.g., a home page of the record. As used herein, a “profile feed” or “user’s profile feed” generally refers to a feed of feed items about a particular user. In one example, the feed items for a profile feed include posts and comments that other users make about or send to the particular user, and status updates made by the particular user. Such a profile feed can be displayed on a page associated with the particular user. In another example, feed items in a profile feed could include posts made by the particular user and feed tracked updates initiated based on actions of the particular user.

[0139] Some non-limiting examples of systems, apparatus, and methods are described below for implementing database systems and enterprise level social networking systems in conjunction with the disclosed techniques. Such implementations can provide more efficient use of a database system. For instance, a user of a database system may not easily know when important information in the database

has changed, e.g., about a project or client. Such implementations can provide feed tracked updates about such changes and other events, thereby keeping users informed.

[0140] FIG. 8A shows a block diagram of an example of an environment 10 in which an on-demand database service exists and can be used in accordance with some implementations. Environment 10 may include user systems 12, network 14, database system 16, processor system 17, application platform 18, network interface 20, tenant data storage 22, system data storage 24, program code 26, and process space 28. In other implementations, environment 10 may not have all of these components and/or may have other components instead of, or in addition to, those listed above.

[0141] A user system 12 may be implemented as any computing device(s) or other data processing apparatus such as a machine or system used by a user to access a database system 16. For example, any of user systems 12 can be a handheld and/or portable computing device such as a mobile phone, a smartphone, a laptop computer, or a tablet. Other examples of a user system include computing devices such as a work station and/or a network of computing devices. As illustrated in FIG. 8A (and in more detail in FIG. 8B) user systems 12 might interact via a network 14 with an on-demand database service, which is implemented in the example of FIG. 8A as database system 16.

[0142] An on-demand database service, implemented using system 16 by way of example, is a service that is made available to users who do not need to necessarily be concerned with building and/or maintaining the database system. Instead, the database system may be available for their use when the users need the database system, i.e., on the demand of the users. Some on-demand database services may store information from one or more tenants into tables of a common database image to form a multi-tenant database system (MTS). A database image may include one or more database objects. A relational database management system (RDBMS) or the equivalent may execute storage and retrieval of information against the database object(s). Application platform 18 may be a framework that allows the applications of system 16 to run, such as the hardware and/or software, e.g., the operating system. In some implementations, application platform 18 enables creation, managing and executing one or more applications developed by the provider of the on-demand database service, users accessing the on-demand database service via user systems 12, or third party application developers accessing the on-demand database service via user systems 12.

[0143] The users of user systems 12 may differ in their respective capacities, and the capacity of a particular user system 12 might be entirely determined by permissions (permission levels) for the current user. For example, when a salesperson is using a particular user system 12 to interact with system 16, the user system has the capacities allotted to that salesperson. However, while an administrator is using that user system to interact with system 16, that user system has the capacities allotted to that administrator. In systems with a hierarchical role model, users at one permission level may have access to applications, data, and database information accessible by a lower permission level user, but may not have access to certain applications, database information, and data accessible by a user at a higher permission level. Thus, different users will have different capabilities with regard to accessing and modifying application and

database information, depending on a user's security or permission level, also called authorization.

[0144] Network 14 is any network or combination of networks of devices that communicate with one another. For example, network 14 can be any one or any combination of a LAN (local area network), WAN (wide area network), telephone network, wireless network, point-to-point network, star network, token ring network, hub network, or other appropriate configuration. Network 14 can include a TCP/IP (Transfer Control Protocol and Internet Protocol) network, such as the global internetwork of networks often referred to as the Internet. The Internet will be used in many of the examples herein. However, it should be understood that the networks that the present implementations might use are not so limited.

[0145] User systems 12 might communicate with system 16 using TCP/IP and, at a higher network level, use other common Internet protocols to communicate, such as HTTP, FTP, AFS, WAP, etc. In an example where HTTP is used, user system 12 might include an HTTP client commonly referred to as a "browser" for sending and receiving HTTP signals to and from an HTTP server at system 16. Such an HTTP server might be implemented as the sole network interface 20 between system 16 and network 14, but other techniques might be used as well or instead. In some implementations, the network interface 20 between system 16 and network 14 includes load sharing functionality, such as round-robin HTTP request distributors to balance loads and distribute incoming HTTP requests evenly over a plurality of servers. At least for users accessing system 16, each of the plurality of servers has access to the MTS' data; however, other alternative configurations may be used instead.

[0146] In one implementation, system 16, shown in FIG. 8A, implements a web-based CRM system. For example, in one implementation, system 16 includes application servers configured to implement and execute CRM software applications as well as provide related data, code, forms, web pages and other information to and from user systems 12 and to store to, and retrieve from, a database system related data, objects, and Webpage content. With a multi-tenant system, data for multiple tenants may be stored in the same physical database object in tenant data storage 22, however, tenant data typically is arranged in the storage medium(s) of tenant data storage 22 so that data of one tenant is kept logically separate from that of other tenants so that one tenant does not have access to another tenant's data, unless such data is expressly shared. In certain implementations, system 16 implements applications other than, or in addition to, a CRM application. For example, system 16 may provide tenant access to multiple hosted (standard and custom) applications, including a CRM application. User (or third party developer) applications, which may or may not include CRM, may be supported by the application platform 18, which manages creation, storage of the applications into one or more database objects and executing of the applications in a virtual machine in the process space of the system 16.

[0147] One arrangement for elements of system 16 is shown in FIGS. 7A and 7B, including a network interface 20, application platform 18, tenant data storage 22 for tenant data 23, system data storage 24 for system data 25 accessible to system 16 and possibly multiple tenants, program code 26 for implementing various functions of system 16, and a process space 28 for executing MTS system processes and

tenant-specific processes, such as running applications as part of an application hosting service. Additional processes that may execute on system 16 include database indexing processes.

[0148] Several elements in the system shown in FIG. 8A include conventional, well-known elements that are explained only briefly here. For example, each user system 12 could include a desktop personal computer, workstation, laptop, PDA, cell phone, or any wireless access protocol (WAP) enabled device or any other computing device capable of interfacing directly or indirectly to the Internet or other network connection. The term “computing device” is also referred to herein simply as a “computer”. User system 12 typically runs an HTTP client, e.g., a browsing program, such as Microsoft’s Internet Explorer browser, Netscape’s Navigator browser, Opera’s browser, or a WAP-enabled browser in the case of a cell phone, PDA or other wireless device, or the like, allowing a user (e.g., subscriber of the multi-tenant database system) of user system 12 to access, process and view information, pages and applications available to it from system 16 over network 14. Each user system 12 also typically includes one or more user input devices, such as a keyboard, a mouse, trackball, touch pad, touch screen, pen or the like, for interacting with a GUI provided by the browser on a display (e.g., a monitor screen, LCD display, OLED display, etc.) of the computing device in conjunction with pages, forms, applications and other information provided by system 16 or other systems or servers. Thus, “display device” as used herein can refer to a display of a computer system such as a monitor or touch-screen display, and can refer to any computing device having display capabilities such as a desktop computer, laptop, tablet, smartphone, a television set-top box, or wearable device such as Google Glass® or other human body-mounted display apparatus. For example, the display device can be used to access data and applications hosted by system 16, and to perform searches on stored data, and otherwise allow a user to interact with various GUI pages that may be presented to a user. As discussed above, implementations are suitable for use with the Internet, although other networks can be used instead of or in addition to the Internet, such as an intranet, an extranet, a virtual private network (VPN), a non-TCP/IP based network, any LAN or WAN or the like.

[0149] According to one implementation, each user system 12 and all of its components are operator configurable using applications, such as a browser, including computer code run using a central processing unit such as an Intel Pentium® processor or the like. Similarly, system 16 (and additional instances of an MTS, where more than one is present) and all of its components might be operator configurable using application(s) including computer code to run using processor system 17, which may be implemented to include a central processing unit, which may include an Intel Pentium® processor or the like, and/or multiple processor units. Non-transitory computer-readable media can have instructions stored thereon/in, that can be executed by or used to program a computing device to perform any of the methods of the implementations described herein. Computer program code 26 implementing instructions for operating and configuring system 16 to intercommunicate and to process web pages, applications and other data and media content as described herein is preferably downloadable and stored on a hard disk, but the entire program code, or portions thereof, may also be stored in any other volatile or

non-volatile memory medium or device as is well known, such as a ROM or RAM, or provided on any media capable of storing program code, such as any type of rotating media including floppy disks, optical discs, digital versatile disk (DVD), compact disk (CD), microdrive, and magneto-optical disks, and magnetic or optical cards, nanosystems (including molecular memory ICs), or any other type of computer-readable medium or device suitable for storing instructions and/or data. Additionally, the entire program code, or portions thereof, may be transmitted and downloaded from a software source over a transmission medium, e.g., over the Internet, or from another server, as is well known, or transmitted over any other conventional network connection as is well known (e.g., extranet, VPN, LAN, etc.) using any communication medium and protocols (e.g., TCP/IP, HTTP, HTTPS, Ethernet, etc.) as are well known. It will also be appreciated that computer code for the disclosed implementations can be realized in any programming language that can be executed on a client system and/or server or server system such as, for example, C, C++, HTML, any other markup language, Java™, JavaScript, ActiveX, any other scripting language, such as VBScript, and many other programming languages as are well known may be used. (Java™ is a trademark of Sun Microsystems, Inc.).

[0150] According to some implementations, each system 16 is configured to provide web pages, forms, applications, data and media content to user (client) systems 12 to support the access by user systems 12 as tenants of system 16. As such, system 16 provides security mechanisms to keep each tenant’s data separate unless the data is shared. If more than one MTS is used, they may be located in close proximity to one another (e.g., in a server farm located in a single building or campus), or they may be distributed at locations remote from one another (e.g., one or more servers located in city A and one or more servers located in city B). As used herein, each MTS could include one or more logically and/or physically connected servers distributed locally or across one or more geographic locations. Additionally, the term “server” is meant to refer to one type of computing device such as a system including processing hardware and process space(s), an associated storage medium such as a memory device or database, and, in some instances, a database application (e.g., OODBMS or RDBMS) as is well known in the art. It should also be understood that “server system” and “server” are often used interchangeably herein. Similarly, the database objects described herein can be implemented as single databases, a distributed database, a collection of distributed databases, a database with redundant online or offline backups or other redundancies, etc., and might include a distributed database or storage network and associated processing intelligence.

[0151] FIG. 8B shows a block diagram of an example of some implementations of elements of FIG. 8A and various possible interconnections between these elements. That is, FIG. 8B also illustrates environment 10. However, in FIG. 8B elements of system 16 and various interconnections in some implementations are further illustrated. FIG. 8B shows that user system 12 may include processor system 12A, memory system 12B, input system 12C, and output system 12D. FIG. 8B shows network 14 and system 16. FIG. 8B also shows that system 16 may include tenant data storage 22, tenant data 23, system data storage 24, system data 25, User Interface (UI) 30, Application Program Interface (API) 32, PL/SOQL 34, save routines 36, application setup mecha-

nism 38, application servers 50₁-50_N, system process space 52, tenant process spaces 54, tenant management process space 60, tenant storage space 62, user storage 64, and application metadata 66. In other implementations, environment 10 may not have the same elements as those listed above and/or may have other elements instead of, or in addition to, those listed above.

[0152] User system 12, network 14, system 16, tenant data storage 22, and system data storage 24 were discussed above in FIG. 8A. Regarding user system 12, processor system 12A may be any combination of one or more processors. Memory system 12B may be any combination of one or more memory devices, short term, and/or long term memory. Input system 12C may be any combination of input devices, such as one or more keyboards, mice, trackballs, scanners, cameras, and/or interfaces to networks. Output system 12D may be any combination of output devices, such as one or more monitors, printers, and/or interfaces to networks. As shown by FIG. 8B, system 16 may include a network interface 20 (of FIG. 8A) implemented as a set of application servers 50, an application platform 18, tenant data storage 22, and system data storage 24. Also shown is system process space 52, including individual tenant process spaces 54 and a tenant management process space 60. Each application server 50 may be configured to communicate with tenant data storage 22 and the tenant data 23 therein, and system data storage 24 and the system data 25 therein to serve requests of user systems 12. The tenant data 23 might be divided into individual tenant storage spaces 62, which can be either a physical arrangement and/or a logical arrangement of data. Within each tenant storage space 62, user storage 64 and application metadata 66 might be similarly allocated for each user. For example, a copy of a user's most recently used (MRU) items might be stored to user storage 64. Similarly, a copy of MRU items for an entire organization that is a tenant might be stored to tenant storage space 62. A UI 30 provides a user interface and an API 32 provides an application programmer interface to system 16 resident processes to users and/or developers at user systems 12. The tenant data and the system data may be stored in various databases, such as one or more Oracle® databases.

[0153] Application platform 18 includes an application setup mechanism 38 that supports application developers' creation and management of applications, which may be saved as metadata into tenant data storage 22 by save routines 36 for execution by subscribers as one or more tenant process spaces 54 managed by tenant management process 60 for example. Invocations to such applications may be coded using PL/SOQL 34 that provides a programming language style interface extension to API 32. A detailed description of some PL/SOQL language implementations is discussed in commonly assigned U.S. Pat. No. 7,730,478, titled METHOD AND SYSTEM FOR ALLOWING ACCESS TO DEVELOPED APPLICATIONS VIA A MULTI-TENANT ON-DEMAND DATABASE SERVICE, by Craig Weissman, issued on Jun. 1, 2010, and hereby incorporated by reference in its entirety and for all purposes. Invocations to applications may be detected by one or more system processes, which manage retrieving application metadata 66 for the subscriber making the invocation and executing the metadata as an application in a virtual machine.

[0154] Each application server 50 may be communicably coupled to database systems, e.g., having access to system

data 25 and tenant data 23, via a different network connection. For example, one application server 50₁ might be coupled via the network 14 (e.g., the Internet), another application server 50_{N-1} might be coupled via a direct network link, and another application server 50_N might be coupled by yet a different network connection. Transfer Control Protocol and Internet Protocol (TCP/IP) are typical protocols for communicating between application servers 50 and the database system. However, it will be apparent to one skilled in the art that other transport protocols may be used to optimize the system depending on the network interconnect used.

[0155] In certain implementations, each application server 50 is configured to handle requests for any user associated with any organization that is a tenant. Because it is desirable to be able to add and remove application servers from the server pool at any time for any reason, there is preferably no server affinity for a user and/or organization to a specific application server 50. In one implementation, therefore, an interface system implementing a load balancing function (e.g., an F5 Big-IP load balancer) is communicably coupled between the application servers 50 and the user systems 12 to distribute requests to the application servers 50. In one implementation, the load balancer uses a least connections algorithm to route user requests to the application servers 50. Other examples of load balancing algorithms, such as round robin and observed response time, also can be used. For example, in certain implementations, three consecutive requests from the same user could hit three different application servers 50, and three requests from different users could hit the same application server 50. In this manner, by way of example, system 16 is multi-tenant, wherein system 16 handles storage of, and access to, different objects, data and applications across disparate users and organizations.

[0156] As an example of storage, one tenant might be a company that employs a sales force where each salesperson uses system 16 to manage their sales process. Thus, a user might maintain contact data, leads data, customer follow-up data, performance data, goals and progress data, etc., all applicable to that user's personal sales process (e.g., in tenant data storage 22). In an example of a MTS arrangement, since all of the data and the applications to access, view, modify, report, transmit, calculate, etc., can be maintained and accessed by a user system having nothing more than network access, the user can manage his or her sales efforts and cycles from any of many different user systems. For example, if a salesperson is visiting a customer and the customer has Internet access in their lobby, the salesperson can obtain critical updates as to that customer while waiting for the customer to arrive in the lobby.

[0157] While each user's data might be separate from other users' data regardless of the employers of each user, some data might be organization-wide data shared or accessible by a plurality of users or all of the users for a given organization that is a tenant. Thus, there might be some data structures managed by system 16 that are allocated at the tenant level while other data structures might be managed at the user level. Because an MTS might support multiple tenants including possible competitors, the MTS should have security protocols that keep data, applications, and application use separate. Also, because many tenants may opt for access to an MTS rather than maintain their own system, redundancy, up-time, and backup are additional functions that may be implemented in the MTS. In addition

to user-specific data and tenant-specific data, system 16 might also maintain system level data usable by multiple tenants or other data. Such system level data might include industry reports, news, postings, and the like that are sharable among tenants.

[0158] In certain implementations, user systems 12 (which may be client systems) communicate with application servers 50 to request and update system-level and tenant-level data from system 16 that may involve sending one or more queries to tenant data storage 22 and/or system data storage 24. System 16 (e.g., an application server 50 in system 16) automatically generates one or more SQL statements (e.g., one or more SQL queries) that are designed to access the desired information. System data storage 24 may generate query plans to access the requested data from the database.

[0159] Each database can generally be viewed as a collection of objects, such as a set of logical tables, containing data fitted into predefined categories. A “table” is one representation of a data object, and may be used herein to simplify the conceptual description of objects and custom objects according to some implementations. It should be understood that “table” and “object” may be used interchangeably herein. Each table generally contains one or more data categories logically arranged as columns or fields in a viewable schema. Each row or record of a table contains an instance of data for each category defined by the fields. For example, a CRM database may include a table that describes a customer with fields for basic contact information such as name, address, phone number, fax number, etc. Another table might describe a purchase order, including fields for information such as customer, product, sale price, date, etc. In some multi-tenant database systems, standard entity tables might be provided for use by all tenants. For CRM database applications, such standard entities might include tables for case, account, contact, lead, and opportunity data objects, each containing pre-defined fields. It should be understood that the word “entity” may also be used interchangeably herein with “object” and “table”.

[0160] In some multi-tenant database systems, tenants may be allowed to create and store custom objects, or they may be allowed to customize standard entities or objects, for example by creating custom fields for standard objects, including custom index fields. Commonly assigned U.S. Pat. No. 7,779,039, titled CUSTOM ENTITIES AND FIELDS IN A MULTI-TENANT DATABASE SYSTEM, by Weissman et al., issued on Aug. 17, 2010, and hereby incorporated by reference in its entirety and for all purposes, teaches systems and methods for creating custom objects as well as customizing standard objects in a multi-tenant database system. In certain implementations, for example, all custom entity data rows are stored in a single multi-tenant physical table, which may contain multiple logical tables per organization. It is transparent to customers that their multiple “tables” are in fact stored in one large table or that their data may be stored in the same table as the data of other customers.

[0161] FIG. 9A shows a system diagram of an example of architectural components of an on-demand database service environment 900, in accordance with some implementations. A client machine located in the cloud 904, generally referring to one or more networks in combination, as described herein, may communicate with the on-demand database service environment via one or more edge routers 908 and 912. A client machine can be any of the examples

of user systems 12 described above. The edge routers may communicate with one or more core switches 920 and 924 via firewall 916. The core switches may communicate with a load balancer 928, which may distribute server load over different pods, such as the pods 940 and 944. The pods 940 and 944, which may each include one or more servers and/or other computing resources, may perform data processing and other operations used to provide on-demand services. Communication with the pods may be conducted via pod switches 932 and 936. Components of the on-demand database service environment may communicate with a database storage 956 via a database firewall 948 and a database switch 952.

[0162] As shown in FIGS. 8A and 8B, accessing an on-demand database service environment may involve communications transmitted among a variety of different hardware and/or software components. Further, the on-demand database service environment 900 is a simplified representation of an actual on-demand database service environment. For example, while only one or two devices of each type are shown in FIGS. 8A and 8B, some implementations of an on-demand database service environment may include anywhere from one to many devices of each type. Also, the on-demand database service environment need not include each device shown in FIGS. 8A and 8B, or may include additional devices not shown in FIGS. 8A and 8B.

[0163] Moreover, one or more of the devices in the on-demand database service environment 900 may be implemented on the same physical device or on different hardware. Some devices may be implemented using hardware or a combination of hardware and software. Thus, terms such as “data processing apparatus,” “machine,” “server” and “device” as used herein are not limited to a single hardware device, but rather include any hardware and software configured to provide the described functionality.

[0164] The cloud 904 is intended to refer to a data network or combination of data networks, often including the Internet. Client machines located in the cloud 904 may communicate with the on-demand database service environment to access services provided by the on-demand database service environment. For example, client machines may access the on-demand database service environment to retrieve, store, edit, and/or process information.

[0165] In some implementations, the edge routers 908 and 912 route packets between the cloud 904 and other components of the on-demand database service environment 900. The edge routers 908 and 912 may employ the Border Gateway Protocol (BGP).

[0166] The BGP is the core routing protocol of the Internet. The edge routers 908 and 912 may maintain a table of IP networks or ‘prefixes’, which designate network reachability among autonomous systems on the Internet.

[0167] In one or more implementations, the firewall 916 may protect the inner components of the on-demand database service environment 900 from Internet traffic. The firewall 916 may block, permit, or deny access to the inner components of the on-demand database service environment 900 based upon a set of rules and other criteria. The firewall 916 may act as one or more of a packet filter, an application gateway, a stateful filter, a proxy server, or any other type of firewall.

[0168] In some implementations, the core switches 920 and 924 are high-capacity switches that transfer packets within the on-demand database service environment 900.

The core switches **920** and **924** may be configured as network bridges that quickly route data between different components within the on-demand database service environment. In some implementations, the use of two or more core switches **920** and **924** may provide redundancy and/or reduced latency.

[0169] In some implementations, the pods **940** and **944** may perform the core data processing and service functions provided by the on-demand database service environment. Each pod may include various types of hardware and/or software computing resources. An example of the pod architecture is discussed in greater detail with reference to FIG. 9B.

[0170] In some implementations, communication between the pods **940** and **944** may be conducted via the pod switches **932** and **936**. The pod switches **932** and **936** may facilitate communication between the pods **940** and **944** and client machines located in the cloud **904**, for example via core switches **920** and **924**. Also, the pod switches **932** and **936** may facilitate communication between the pods **940** and **944** and the database storage **956**.

[0171] In some implementations, the load balancer **928** may distribute workload between the pods **940** and **944**. Balancing the on-demand service requests between the pods may assist in improving the use of resources, increasing throughput, reducing response times, and/or reducing overhead. The load balancer **928** may include multilayer switches to analyze and forward traffic.

[0172] In some implementations, access to the database storage **956** may be guarded by a database firewall **948**. The database firewall **948** may act as a computer application firewall operating at the database application layer of a protocol stack. The database firewall **948** may protect the database storage **956** from application attacks such as structure query language (SQL) injection, database rootkits, and unauthorized information disclosure.

[0173] In some implementations, the database firewall **948** may include a host using one or more forms of reverse proxy services to proxy traffic before passing it to a gateway router. The database firewall **948** may inspect the contents of database traffic and block certain content or database requests. The database firewall **948** may work on the SQL application level atop the TCP/IP stack, managing applications' connection to the database or SQL management interfaces as well as intercepting and enforcing packets traveling to or from a database network or application interface.

[0174] In some implementations, communication with the database storage **956** may be conducted via the database switch **952**. The multi-tenant database storage **956** may include more than one hardware and/or software components for handling database queries. Accordingly, the database switch **952** may direct database queries transmitted by other components of the on-demand database service environment (e.g., the pods **940** and **944**) to the correct components within the database storage **956**.

[0175] In some implementations, the database storage **956** is an on-demand database system shared by many different organizations. The on-demand database service may employ a multi-tenant approach, a virtualized approach, or any other type of database approach. On-demand database services are discussed in greater detail with reference to FIGS. 9A and 9B.

[0176] FIG. 9B shows a system diagram further illustrating an example of architectural components of an on-demand database service environment, in accordance with some implementations. The pod **944** may be used to render services to a user of the on-demand database service environment **900**. In some implementations, each pod may include a variety of servers and/or other systems. The pod **944** includes one or more content batch servers **964**, content search servers **968**, query servers **982**, file servers **986**, access control system (ACS) servers **980**, batch servers **984**, and app servers **988**. Also, the pod **944** includes database instances **990**, quick file systems (QFS) **992**, and indexers **994**. In one or more implementations, some or all communication between the servers in the pod **944** may be transmitted via the switch **936**.

[0177] The content batch servers **964** may handle requests internal to the pod. These requests may be long-running and/or not tied to a particular customer. For example, the content batch servers **964** may handle requests related to log mining, cleanup work, and maintenance tasks.

[0178] The content search servers **968** may provide query and indexer functions. For example, the functions provided by the content search servers **968** may allow users to search through content stored in the on-demand database service environment.

[0179] The file servers **986** may manage requests for information stored in the file storage **998**. The file storage **998** may store information such as documents, images, and basic large objects (BLOBs). By managing requests for information using the file servers **986**, the image footprint on the database may be reduced.

[0180] The query servers **982** may be used to retrieve information from one or more file systems. For example, the query system **982** may receive requests for information from the app servers **988** and then transmit information queries to the NFS **996** located outside the pod.

[0181] The pod **944** may share a database instance **990** configured as a multi-tenant environment in which different organizations share access to the same database. Additionally, services rendered by the pod **944** may call upon various hardware and/or software resources. In some implementations, the ACS servers **980** may control access to data, hardware resources, or software resources.

[0182] In some implementations, the batch servers **984** may process batch jobs, which are used to run tasks at specified times. Thus, the batch servers **984** may transmit instructions to other servers, such as the app servers **988**, to trigger the batch jobs.

[0183] In some implementations, the QFS **992** may be an open source file system available from Sun Microsystems® of Santa Clara, Calif. The QFS may serve as a rapid-access file system for storing and accessing information available within the pod **944**. The QFS **992** may support some volume management capabilities, allowing many disks to be grouped together into a file system. File system metadata can be kept on a separate set of disks, which may be useful for streaming applications where long disk seeks cannot be tolerated. Thus, the QFS system may communicate with one or more content search servers **968** and/or indexers **994** to identify, retrieve, move, and/or update data stored in the network file systems **996** and/or other storage systems.

[0184] In some implementations, one or more query servers **982** may communicate with the NFS **996** to retrieve and/or update information stored outside of the pod **944**. The

NFS 996 may allow servers located in the pod 944 to access information to access files over a network in a manner similar to how local storage is accessed.

[0185] In some implementations, queries from the query servers 922 may be transmitted to the NFS 996 via the load balancer 928, which may distribute resource requests over various resources available in the on-demand database service environment. The NFS 996 may also communicate with the QFS 992 to update the information stored on the NFS 996 and/or to provide information to the QFS 992 for use by servers located within the pod 944.

[0186] In some implementations, the pod may include one or more database instances 990. The database instance 990 may transmit information to the QFS 992. When information is transmitted to the QFS, it may be available for use by servers within the pod 944 without using an additional database call.

[0187] In some implementations, database information may be transmitted to the indexer 994. Indexer 994 may provide an index of information available in the database 990 and/or QFS 992. The index information may be provided to file servers 986 and/or the QFS 992.

[0188] In some implementations, one or more application servers or other servers described above with reference to FIGS. 7A and 7B include a hardware and/or software framework configurable to execute procedures using programs, routines, scripts, etc. Thus, in some implementations, one or more of application servers 50₁-50_N of FIG. 8B can be configured to initiate performance of one or more of the operations described above by instructing another computing device to perform an operation. In some implementations, one or more application servers 50₁-50_N carry out, either partially or entirely, one or more of the disclosed operations. In some implementations, app servers 988 of FIG. 9B support the construction of applications provided by the on-demand database service environment 900 via the pod 944. Thus, an app server 988 may include a hardware and/or software framework configurable to execute procedures to partially or entirely carry out or instruct another computing device to carry out one or more operations disclosed herein. In alternative implementations, two or more app servers 988 may cooperate to perform or cause performance of such operations. Any of the databases and other storage facilities described above with reference to FIGS. 7A, 7B, 8A and 8B can be configured to store lists, articles, documents, records, files, and other objects for implementing the operations described above. For instance, lists of available communication channels associated with share actions for sharing a type of data item can be maintained in tenant data storage 22 and/or system data storage 24 of FIGS. 7A and 7B. By the same token, lists of default or designated channels for particular share actions can be maintained in storage 22 and/or storage 24. In some other implementations, rather than storing one or more lists, articles, documents, records, and/or files, the databases and other storage facilities described above can store pointers to the lists, articles, documents, records, and/or files, which may instead be stored in other repositories external to the systems and environments described above with reference to FIGS. 7A, 7B, 8A and 8B.

[0189] While some of the disclosed implementations may be described with reference to a system having an application server providing a front end for an on-demand database service capable of supporting multiple tenants, the disclosed

implementations are not limited to multi-tenant databases nor deployment on application servers. Some implementations may be practiced using various database architectures such as ORACLE®, DB2® by IBM and the like without departing from the scope of the implementations claimed.

[0190] It should be understood that some of the disclosed implementations can be embodied in the form of control logic using hardware and/or computer software in a modular or integrated manner. Other ways and/or methods are possible using hardware and a combination of hardware and software.

[0191] Any of the disclosed implementations may be embodied in various types of hardware, software, firmware, and combinations thereof. For example, some techniques disclosed herein may be implemented, at least in part, by computer-readable media that include program instructions, state information, etc., for performing various services and operations described herein. Examples of program instructions include both machine code, such as produced by a compiler, and files containing higher-level code that may be executed by a computing device such as a server or other data processing apparatus using an interpreter. Examples of computer-readable media include, but are not limited to: magnetic media such as hard disks, floppy disks, and magnetic tape; optical media such as flash memory, compact disk (CD) or digital versatile disk (DVD); magneto-optical media; and hardware devices specially configured to store program instructions, such as read-only memory (ROM) devices and random access memory (RAM) devices. A computer-readable medium may be any combination of such storage devices.

[0192] Any of the operations and techniques described in this application may be implemented as software code to be executed by a processor using any suitable computer language such as, for example, Java, C++ or Perl using, for example, object-oriented techniques. The software code may be stored as a series of instructions or commands on a computer-readable medium. Computer-readable media encoded with the software/program code may be packaged with a compatible device or provided separately from other devices (e.g., via Internet download). Any such computer-readable medium may reside on or within a single computing device or an entire computer system, and may be among other computer-readable media within a system or network. A computer system or computing device may include a monitor, printer, or other suitable display for providing any of the results mentioned herein to a user.

[0193] While various implementations have been described herein, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of the present application should not be limited by any of the implementations described herein, but should be defined only in accordance with the following and later-submitted claims and their equivalents.

What is claimed is:

1. A computer-implemented online learning system for dynamically providing computer-generated sequences of content including educational content and tracking progress in relation to the computer-generated sequences, comprising:

- a database system implemented using a server system including at least one processor, the database system configurable to cause:

- ascertaining a goal of a user of the database system based, at least in part, on at least one of: an indication of user input received from a client device or user feature data of the user stored in at least one database, the user feature data including one or more feature values pertaining to one or more of a plurality of user features; identifying, using user goal information stored in at least one database, a plurality of users of the database system that have reached the goal;
- obtaining, for each of the plurality of users, a corresponding plurality of feature values corresponding to the plurality of user features based, at least in part, on user feature information stored in at least one database;
- aggregating the plurality of feature values for each of the plurality of users such that a set of feature values corresponding to the plurality of users is generated and stored;
- generating a list of content items for the user based, at least in part, on the set of feature values corresponding to the plurality of users and a plurality of feature values of the user, the plurality of feature values of the user corresponding to the plurality of user features, the list of content items including a plurality of content items and being identifiable by one or more data objects stored in a database;
- providing or updating a web page of a web site for display by a client device such that the web page includes a plurality of user interface elements representing the list of content items, the web page being associated with the user, at least one content item in the list of content items representing a recommended learning module that is accessible via the web site or a recommended sequence of learning modules that is accessible via the web site, and at least one of the content items having an associated user interface object displayable within or in close proximity to the corresponding user interface element;
- tracking progress of the user toward completion of actions corresponding to the content items in the list of content items based, at least in part, on an indication of interaction by the user with at least one user interface object of the web page corresponding to one of the content items;
- updating metadata stored in association with the list according to the progress of the user; and
- for at least one of the content items in the list, providing, in the web page for display by the client device, an indication of progress or completion of the corresponding action by the user according to the progress of the user.
2. The computer-implemented online learning system as recited in claim 1, the goal including a particular career, a particular business role, a particular job position, a particular set of one or more skills, a particular credential, or a particular certification.
 3. The computer-implemented online learning system as recited in claim 1, the database system further configurable to cause:
 - applying a machine learning algorithm to the set of feature values corresponding to the plurality of users such that a machine learning model is generated; and
 - generating the list of content items for the user by applying the machine learning model to the plurality of feature values of the user.
 4. The computer-implemented online learning system as recited in claim 1, one or more of the content items further identifying, including, or representing at least one of: a recommended credential or certification that can be obtained via the web site, a recommended job position, a recommended career, a group that is accessible via the web site and recommended for the user to join, a recommendation to follow a particular user via the web site, a topic that is recommended for the user to follow via the web site, a recommended event, or a recommended off-site course.
 5. The computer-implemented online learning system as recited in claim 1, the database system further configurable to cause:
 - providing, for presentation via a client device of a user, one or more questions via one or more web pages of the web site;
 - obtaining one or more answers received from the client device responsive to the questions, the answers indicating the goal of the user; and
 - saving an indication of the goal in association with the user;
 - wherein generating the list of content items and providing or updating the web page are performed in real-time responsive to obtaining the answers.
 6. The computer-implemented online learning system as recited in claim 1, the database system further configurable to cause:
 - responsive to processing an indication of user interaction with a user interface object presented in association with the recommended learning module or sequence of learning modules, starting the recommended learning module or sequence of learning modules, resuming the recommended learning module or sequence of learning modules, or storing an indication that the recommended learning module or sequence of learning modules has been completed by the user.
 7. The computer-implemented online learning system as recited in claim 1, wherein for each specific user of a group of users including the user and the plurality of users, the user features comprise one or more of:
 - a history of interaction of the specific user with database records stored in a database of the database system, a learning module that is accessible via the web site and with which the specific user has interacted, an amount of progress of the specific user with respect to a learning module that is accessible via the web site and with which the corresponding specific user has interacted, a learning module that is accessible via the web site and that the specific user has completed, a sequence of learning modules that is accessible via the web site and with which the specific user has interacted, a sequence of learning modules that is accessible via the web site and that the specific user has completed, an amount of progress of the specific user with respect to a sequence of learning modules that is accessible via the web site, a credential or certification that has been obtained by the specific user, a current job position, a prior job position, a career, a set of skills, an amount of experience, a group that is accessible via the web site and of which the specific user is a member, a particular user that the specific user is following via the web site, a particular topic that is being followed by the specific user via the web site, a topic web page that has been accessed by the specific user via the web site, a post of

the specific user that has been published via the web site, a question that has been posted by the specific user via the web site, an answer that has been posted by the specific user via the web site in response to a question that has been posted by another user, a user goal, whether the user goal has been achieved, a level of progress or completion of a custom course that has been system generated for the user, or a level of accuracy with which user progresses in the custom course.

8. The computer-implemented online learning system as recited in claim 1, the database system further configurable to cause:

after providing or updating the web page of the web site for display by the client device of the user, updating the list of content items to remove one of the content items from the list or adding an additional content item to the list.

9. A computer-implemented method for dynamically providing computer-generated sequences of content including educational content, comprising:

ascertaining a goal of a user of the database system based, at least in part, on at least one of: an indication of user input received from a client device or user feature data of the user stored in at least one database, the user feature data including one or more feature values pertaining to one or more of a plurality of user features; identifying, using user goal information stored in at least one database, a plurality of users of the database system that have reached the goal;

obtaining, for each of the plurality of users, a corresponding plurality of feature values corresponding to the plurality of user features based, at least in part, on user feature information stored in at least one database;

aggregating the plurality of feature values for each of the plurality of users such that a set of feature values corresponding to the plurality of users is generated and stored;

generating a list of content items for the user based, at least in part, on the set of feature values corresponding to the plurality of users and a plurality of feature values of the user, the plurality of feature values of the user corresponding to the plurality of user features, the list of content items including a plurality of content items and being identifiable by one or more data objects stored in a database;

providing or updating a web page of a web site for display by a client device such that the web page includes a plurality of user interface elements representing the list of content items, the web page being associated with the user, at least one content item in the list of content items representing a recommended learning module that is accessible via the web site or a recommended sequence of learning modules that is accessible via the web site, and at least one of the content items having an associated user interface object displayable within or in close proximity to the corresponding user interface element;

tracking progress of the user toward completion of actions corresponding to the content items in the list of content items based, at least in part, on an indication of interaction by the user with at least one user interface object of the web page corresponding to one of the content items;

updating metadata stored in association with the list according to the progress of the user; and

for at least one of the content items in the list, providing, in the web page for display by the client device, an indication of progress or completion of the corresponding action by the user according to the progress of the user.

10. The computer-implemented method as recited in claim 9, the goal including a particular career, a particular business role, a particular job position, a particular set of one or more skills, a particular credential, or a particular certification.

11. The computer-implemented method as recited in claim 9, further comprising:

applying a machine learning algorithm to the set of feature values corresponding to the plurality of users such that a machine learning model is generated; and generating the list of content items for the user by applying the machine learning model to the plurality of feature values of the user.

12. The computer-implemented method as recited in claim 9, one or more of the content items further identifying, including, or representing at least one of: a recommended credential or certification that can be obtained via the web site, a recommended job position, a recommended career, a group that is accessible via the web site and recommended for the user to join, a recommendation to follow a particular user via the web site, a topic that is recommended for the user to follow via the web site, a recommended event, or a recommended off-site course.

13. The computer-implemented method as recited in claim 9, further comprising:

providing, for presentation via a client device of a user, one or more questions via one or more web pages of the web site;

obtaining one or more answers received from the client device responsive to the questions, the answers indicating the goal of the user; and

saving an indication of the goal in association with the user;

wherein generating the list of content items and providing or updating the web page are performed in real-time responsive to obtaining the answers.

14. The computer-implemented method as recited in claim 9, further comprising:

responsive to processing an indication of user interaction with a user interface object presented in association with the recommended learning module or sequence of learning modules, starting the recommended learning module or sequence of learning modules, resuming the recommended learning module or sequence of learning modules, or storing an indication that the recommended learning module or sequence of learning modules has been completed by the user.

15. The computer-implemented method as recited in claim 9, wherein for each specific user of a group of users including the user and the plurality of users, the user features comprise one or more of:

a history of interaction of the specific user with database records stored in a database of the database system, a learning module that is accessible via the web site and with which the specific user has interacted, an amount of progress of the specific user with respect to a learning module that is accessible via the web site and

with which the corresponding specific user has interacted, a learning module that is accessible via the web site and that the specific user has completed, a sequence of learning modules that is accessible via the web site and with which the specific user has interacted, a sequence of learning modules that is accessible via the web site and that the specific user has completed, an amount of progress of the specific user with respect to a sequence of learning modules that is accessible via the web site, a credential or certification that has been obtained by the specific user, a current job position, a prior job position, a career, a set of skills, an amount of experience, a group that is accessible via the web site and of which the specific user is a member, a particular user that the specific user is following via the web site, a particular topic that is being followed by the specific user via the web site, a topic web page that has been accessed by the specific user via the web site, a post of the specific user that has been published via the web site, a question that has been posted by the specific user via the web site, an answer that has been posted by the specific user via the web site in response to a question that has been posted by another user, a user goal, whether the user goal has been achieved, a level of progress or completion of a custom course that has been system generated for the user, or a level of accuracy with which user progresses in the custom course

16. A computer program product comprising computer-readable program code capable of being executed by one or more processors when retrieved from a non-transitory computer-readable medium, the program code comprising instructions configurable to cause:

ascertaining a goal of a user of the database system based, at least in part, on at least one of: an indication of user input received from a client device or user feature data of the user stored in at least one database, the user feature data including one or more feature values pertaining to one or more of a plurality of user features; identifying, using user goal information stored in at least one database, a plurality of users of the database system that have reached the goal;

obtaining, for each of the plurality of users, a corresponding plurality of feature values corresponding to the plurality of user features based, at least in part, on user feature information stored in at least one database;

aggregating the plurality of feature values for each of the plurality of users such that a set of feature values corresponding to the plurality of users is generated and stored;

generating a list of content items for the user based, at least in part, on the set of feature values corresponding to the plurality of users and a plurality of feature values of the user, the plurality of feature values of the user corresponding to the plurality of user features, the list of content items including a plurality of content items and being identifiable by one or more data objects stored in a database;

providing or updating a web page of a web site for display by a client device such that the web page includes a plurality of user interface elements representing the list of content items, the web page being associated with the user, at least one content item in the list of content items representing a recommended learning module that is accessible via the web site or a recommended sequence of learning modules that is accessible via the web site, and at least one of the content items having an associated user interface object displayable within or in close proximity to the corresponding user interface element;

tracking progress of the user toward completion of actions corresponding to the content items in the list of content items based, at least in part, on an indication of interaction by the user with at least one user interface object of the web page corresponding to one of the content items;

updating metadata stored in association with the list according to the progress of the user; and

for at least one of the content items in the list, providing, in the web page for display by the client device, an indication of progress or completion of the corresponding action by the user according to the progress of the user.

17. The computer program product as recited in claim **16**, the goal including a particular career, a particular business role, a particular job position, a particular set of one or more skills, a particular credential, or a particular certification.

18. The computer program product as recited in claim **16**, the instructions further configurable to cause:

applying a machine learning algorithm to the set of feature values corresponding to the plurality of users such that a machine learning model is generated; and generating the list of content items for the user by applying the machine learning model to the plurality of feature values of the user.

19. The computer program product as recited in claim **16**, one or more of the content items further identifying, including, or representing at least one of: a recommended credential or certification that can be obtained via the web site, a recommended job position, a recommended career, a group that is accessible via the web site and recommended for the user to join, a recommendation to follow a particular user via the web site, a topic that is recommended for the user to follow via the web site, a recommended event, or a recommended off-site course.

20. The computer program product as recited in claim **16**, the instructions further configurable to cause:

responsive to processing an indication of user interaction with a user interface object presented in association with the recommended learning module or sequence of learning modules, starting the recommended learning module or sequence of learning modules, resuming the recommended learning module or sequence of learning modules, or storing an indication that the recommended learning module or sequence of learning modules has been completed by the user.

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