Colorado at Boulder:
The University of Colorado at Boulder operates a directory service only for the Boulder Campus. The directory contains approximately 50K (30K people) entries and its running on Sun’s Directory Server. The directory is currently being enhanced to facilitate timely updates.

The following categories of CU-Boulder and CU System Office people are included in the CU-Boulder Directory:

- Current Staff and Faculty – current appointment in the Human Resources System
- Current Student – registered for current term or on time out status with future expected return date
- Continuing Education students – currently registered
- Retiree – as determined by classification in the Human Resources system
- Surviving Spouse – as determined by classification in the Human Resources system
- Formal Affiliates – as approved for inclusion by the Directory Governance Board (such as Regents and members of the CU Foundation)
- Libraries Public Patrons – as determined by a public patron entry in the Libraries database
- Sponsored Affiliates – i.e., individuals not affiliated with the CU-Boulder, but involved with activities directly associated with CU-Boulder functions. When requesting or renewing an affiliation, a current full-time faculty or staff member must identify him or herself as the sponsor or contact related to the individual’s University activities. This “sponsor” will provide information describing his or her relationship to the individual and outlining the individual’s affiliation/benefit to CU-Boulder, including the amount of time the sponsorship will be in effect. Both the sponsor and the affiliate will affirm (through written consent) their understanding of their responsibilities related to the use of University resources. Examples of Sponsored Affiliates include visiting researchers, some vendors and contractors, and some conference attendees.

Additional groups (such as future students, former students, alumni and executive boards) may be added at the discretion of the Directory Governance Board. Inclusion parameters must include affiliation definition and affiliation duration.

Directory data is populated from the following sources:

- Human Resources System (HR) – for current faculty, staff, retirees, and surviving spouses
- Student Information System (SIS) – for current or “save” students and current Continuing Education Students
- Unix Unique Account System (Uniquid) – for current Unix account holders
- Identification Card System (BuffOne Card) – for the ID Cardholder’s ISO number, conference attendees and vendors/contractors
- Libraries System – for public patrons
- Telecommunications Management System (Telecomm) – for faculty/staff office numbers (building and room)
- Faculty Information System (FIS) – for faculty-specific information such as degrees and research Housing Resident Management System – housing resident identification

Authenticated manual entry – for formal and sponsored affiliates and for a limited number of self-maintained attributes. All manually entered information must adhere to the University’s responsible conduct laws and policies.

A page with more information that is somewhat out of date, can be found at:
http://www.colorado.edu/its/directoryservices/presentations/
Harvard:
Harvard University has an enterprise directory which contains approximately 200K (80K people) entries. Its LDAP Service based on Sun's Directory Server and OpendLDAP is an attribute authority that is populated using data drawn primarily from the University ID Card system. It contains all current employees (including unpaid appointees), all temporary employees, retirees, students, Arts and Sciences/Division of Continuing Education program participants, Board of Overseers members, affiliates of the Smithsonian Astrophysical Observatory, library special borrowers, subset of consultants, contractors, as well as a handful of other affiliates. It does not contain information on alumni, candidates for admission or individuals from the various auxiliary and executive education programs. Please note that the enterprise directory is not the source of authentication for these individuals. The University's network is managed in a more decentralized manner than networks at many other institutions, and as such, has many directories around the campus which play a role in the delivery of other network-based services.

Directory data is populated from the following sources:
* PeopleSoft to HUID nightly -- XML extract (full load) of extensive people, job and job status data.
* Student Term Bill to HUID nightly -- Registrars send data updates to Term Bill system in feeds at about weekly interval. They get nightly updates from term bill, but data changes to lag a bit, particularly if a Registrar doesn't send updates to Term Bill as often as expected. The biggest issue is lack of a single student system at Harvard.
* Data on Smithsonian Affiliates are sent in batches to HUID regularly.
* Other special roles get entered directly in the HUID system via online applications like Library Special Borrowers, Consultant ID's.
* HUID is system of record for privacy, and Registrars are required to enter their FERPA block cases in HUID. Many of them have to do double data entry, because they have a local standalone student system too.
* IDGEN system generates the HU ID numbers for employees and students. PeopleSoft is integrated for ID generation on a new hire via API. Registrars use it in batch mode.
* Contact data updates are NOT made to LDAP directly.

They will also be looking into Novell’s Nsure Identity Manager 2 (formely dirXML) which allows you to manage the full user lifecycle—deliver first-day access to essential resources, synchronize multiple passwords into a single login, modify or revoke access rights instantly and even support compliance with government regulations.

MIT:
MIT does not have an enterprise LDAP directory. Instead, they operate systems that provide a repository of the type of data normally found in various enterprise directories, and they provide access to that data through a variety of mechanisms. At some point in the future they expect that MIT will operate a number of LDAP directories. Each of these would tend to be populated by the Data Warehouse, Moira, and possibly the MIT ROLES database. Since they have a site license for Oracle, they expect that most of the LDAP directories will use the Oracle product. Currently the largest LDAP directory is the Active Directory instance used to run our central Windows domain.

The MIT Data Warehouse and Athena's Moira server contain data fed from a variety of systems where data entry is initially performed. Moira both feeds the warehouse, and also obtains information from the warehouse.

SAP takes data feeds from both the data warehouse and the MIT ROLES DB. These are generally done as bulk extracts and updates once or several times a day. However, SAP is not utilized as a directory. Active Directory receives an update from the data warehouse once a day. However, it takes updates from Moira in real time. Each time data is modified in Moira and update process binds to AD using LDAP and makes the corresponding modification in AD. The code was written at MIT, using the Netscape LDAP SDK. Note that this is very similar to the more limited update process that propagates Moira groups to our AFS PTS.
Future enhancements include: a) instantiating LDAP directories needed to support some new services, b) improve the efficiencies of some of the data flows, c) reduce the amount of time needed to propagate the data changes to all of the consuming systems and d) continue to improve the quality of the data.

There is no single URL that covers this subject in depth. The following URLs provide information on numerous directory related topics:
- http://web.mit.edu/warehouse/
- http://nic.mit.edu/directory/
- https://ca.mit.edu/moira/index.jhtml
- http://mit.edu/moiradev/doc/
- http://web.mit.edu/warehouse/metadata/sources/all_sources.htm

**Penn State:**
Penn State operates an LDAP based directory service using IBM’s Internet Directory System. Penn State’s and other phone directories are available online through the World Wide Web and other Internet systems. Penn State students, faculty and staff are automatically entered into the directory. This process normally occurs within one week of entry to Penn State. In addition to information commonly found in telephone books (names, phone numbers, and addresses), the directory also contains e-mail addresses and may contain the address of personal Web pages. The directory is updated from data that is kept in the central accounts database. This database, called CACTUS receives nightly feeds of information from OHR, Registrar and other campus locations. Stored procedures are used to reconcile the data from the feeds vs. what's in CACTUS. And finally the directory is updated for official information and the user can update certain “user-modifiable” fields.

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A page with more information that is somewhat out of date can be found at:
- http://aset.its.psu.edu/ldap/

**Stanford:**
Stanford operates both a registry and a directory service. The Stanford Registry (currently under re-examination for its use) offers services that enable the integration of a wide range of academic and administrative systems and services.

The events service sends (posts) and receives (harvests) messages via infrastructure-accessible event queues. Each message indicates a status or data change. Affected business systems (“consumer systems”) harvest relevant events from the queues, and process them as required. The directory service is an LDAP-based read-optimized database of person and account information. Data from the registries are pushed to the directory for consumption. Consumer systems don't access the registries directly (for performance and security reasons), but look at the directory and/or document service. The document service serves registry data to consumer systems in XML format. Access to this service is restricted to X.509 client certificates signed by the Registry Certificate Authority. XML document types include person or account information, course/class enrollment, and authority privileges.

There are also OpenLDAP and Active Directory based directory services. The general way that updates work is through an event system, where events are posted when data changes, and
subscribers listen to the events they are interested in. XML document services are widely used to display data for reading to those subscribers.

More information can be found at:
http://www.stanford.edu/services/directory
http://www.stanford.edu/services/registry

Wisconsin:
The University of Wisconsin has a central repository of information for most of its population. The University Directory Service consists of two main components that work together to gather data from various source systems and present them in a cohesive manner. There are also LDAP servers that are fed from it, but not all applications make use of said directory server. The **UDS Registry** is an Oracle relational database that gathers information from source systems and creates a single view of a person, collecting information from various sources to capture information relating to that person's roles in the University community. The **UDS Directory** is an LDAP (Lightweight Directory Access Protocol) accessible directory service that makes a subset of this information available to client applications and services for use in identification, authentication, authorization and contact management. It contains biographical data about most of its populations (students, staff, faculty and some other populations) as well as high level role information (Student, Faculty, etc.) and identifiers (Campus ID, NetID, etc.). The UDS doesn't contain all information -- course information being the most obvious bit missing. There is a third portion, DREXPORT, which is an export abstract of the Oracle database for applications.

More information can be found at:
http://www.doit.wisc.edu/middleware/directoryservices/index.asp