Here it is necessary to define each of the entities that Moira manages. If the definitions are accurate and complete, then the database and queries can be designed in terms of these definitions.

Person
: A *person* is the human behind a particular *user* account. This person might or might not have an *account* at this time. Each person has attributes such as their real name, their ID number, and their class (academic year, staff, etc) which will not change or will change very infrequently. The person's real name is not necessarily unique, although their ID number is. This information is usually obtained from the registrar. Only administrators are allowed to change this information. It is considered private, and is not publicly available. Each person also has a version of their name that they show to the public, along with their address and phone number. This "finger information" is public, and can be modified by that person.

User
: The term *user* will refer usually to a UNIX account, not to the *person* using the account. An account has a UNIX login name, a UID, a GID, and associated information, and is also a kerberos principal. The login name is initially chosen by the person, and may not be changed except by an administrator. The UID and GID are assigned by athena and may not be changed by the user. The account also has a shell and a *mail drop* which can be set by the user. A person is associated with most accounts, although a person may have more than one account, and an account might not belong to a single person. All account information is publicly available.

Mail Drop
: This is where mail addressed to a particular account is sent. It may be either a post office box, or an SMTP address. A post office box is a drop on a post office server machine. The box name is the same as the user's login name, and the machine must be a registered post office. SMTP addresses are character strings which are not parsed by the Service Management System. They should be mail addresses that make sense from the Athena Mail Hub. This information is publicly available.

Machine
: A machine is a host computer on the network. It may be a workstation or a server. It has a name, one or more addresses, and a type such as **vax** or **rt**. It also belongs to a collection of service *clusters*. This information is publicly available.

Cluster
: A *cluster* is a mapping of *machines* to service locations. In general, it corresponds to a group of machines in a room. When a machine requests its *cluster* information, it gets the *cluster data* associated with each of the clusters it is a member of. For example if a room has several vaxen and several rt's, then you might need 3 clusters: one that all of the vaxen belong to that lists the vax-specific services, another that all of the rt's belong to the lists the rt-specific services, and a third that all of the workstations in that room belong to that lists all of the common services (although you could do this with just two clusters, duplicating the common info in the vax & rt -specific clusters). This information is publicly available.

Cluster Data
: Each *machine* has a minimum set of services that it must be able to locate: **SYSLIB, USRLIB, LPR, ZEPHYR, HESIOD**, and **KERBEROS**. These are identified by **type**, i.e. the service it locates, the cluster **name**, and the name of the specific **service instance**. This information is publicly available.

Filesystem
: A *filesystem* is a reference to all or part of a physical filesystem. There are two kinds of filesystems: **nfs** and **rvd**. An **rvd** filesystem exists on a particular *machine*, and has a number of other parameters which are not significant to Moira. An **nfs** filesystem exists on a registered *NFS physical filesystem*. A single *filesystem* name may correspond to several different physical filesystems, ordered in a particular way. Each filesystem has a name that makes sense to the server machine, a mount point the client needs, and an access mode. It may be necessary for a structure to be created on the server, for this both an individual owner and group owning list are specified. Each filesystem is of a particular type (such as **HOMEDIR**, **PROJECT**, or **SYSTEM**). This information is publicly available.

Locker
: A *locker* is a special case of a *filesystem*. Its name is also a username. It is of type **nfs**, and has a mount point of "/mit/*name*", an owner of *name*, an owning group of

name's *user group*, and a locker-type of **HOMEDIR**. There is only one physical filesystem matching this filesystem. There is a quota on the filesystem.

NFS Physical Filesystem
: This names a disk partition that is exported for NFS use. It is identified by the *machine* name and the device name of the partition. It has a particular size and allocation. It also has a status which indicates what types of filesystems may be placed on it. The allocation is the sum of all of the quotas assigned to the partition.

Quota
: A *quota* is the amount of storage a particular user is allowed on a particular filesystem. If a user is granted quotas on two or more filesystems on the same physical filesystem, he will have the sum of those two quotas to split between the filesystems. A user without an explicit quota on a filesystem will have a (very small) quota assigned.

List
: A list is a collection of *users*, *lists*, and character strings. A list has a name, a description, some attributes, and an owner in addition to its members. The owner may be a user or a list. If the owner is a list, it may be the same list (self-referential), or another list. The list attributes are **active, hidden, public, maillist**, and **group**. If a list is **active**, it will appear to the name servers and mail servers as appropriate, otherwise it cannot be used. A **hidden** list's existence should not be known unless the person inquiring is an owner. The list may still be visible from the mail server or name server, but the Service Management System will not disclose it. A **public** list is one that anyone may add themselves to or remove themselves from. A list may be a **maillist**, indicating that it should be loaded onto the central mail hub so that the Athena mail server can use it. A list may also be a **group** and have a UNIX UID associated with it. With the exception of **public** lists, only the list owners may change the membership of a list. The owners may also change the description and the attributes. This information is publicly available.

Maillist
: A maillist is a *list* with the **maillist** attribute set. If the list is also **active**, then it will be loaded onto the mail hub so that mail sent to the list name will be sent to each of the members of the list. Because of this expansion, each member of the list must be a user, a string which is really an SMTP address, or another maillist. So any list which is a member of a maillist must itself be a maillist. *User groups* should not be on maillists, since a usergroup cannot be distinguished from a reference to the actual *user*.

Group
: A *group* is a *list* with the **group** attribute set and a GID assigned. If the **active** attribute is also set, then it will be loaded into the hesiod nameserver so that it may be used as a UNIX user group.

User Group
: A *user group* is a *list* which is also a *group*, and its name is the same as a username. Usually the only member is that user, and the user is also the owner. Because there are many user groups, and most of them are never used except to feed the nameserver, their storage is optimized if they are not referenced by another list and do not have any other members.

ACL
: Many entities in the database have *Access Control List*s associated with them: lists, services, filesystems, zephyr and queries. Each ACL has a type field and a name field. The type may be **NONE**, indicating that no access is to be allowed. If may be **USER**, and the name will be a login name, indicating that that user will have access. Or it may be **LIST** and the name of a list, indicating that anyone on that list or any of its sub-lists will have access to the entity.

Zephyr class
: A given *class* of zephyr message may need access control. There are four different access control lists that are needed for each zephyr class: **xmt, sub, iws**, and **iui**. The absence of an ACL is different from an empty ACL.

Service
: A service is a software system that gets updated by Moira, for example **HESIOD** or **NFS**. There are many pieces of data necessary to keep track of the correct and efficient updating of these services. There may be a few items that are service

specific that need to be remembered for each instance of that service.

Printer — There are lots of things you might want to know about a printer, but we don't have a queuing system to make use of them. So for now, Moira only manages printcap entries for the nameserver.

Aliases — Alternate names for *filesystems* and *services* are remembered as aliases. When the nameserver is loaded, these aliases are loaded as additional names for these objects.