We require a resource manager for IT and business resources at Hypotheticorp, LLC. The kinds of reservations that are needed include:

- Software engineers and QA staff need to reserve computing resources for software development.
- Back-end IT staff need to reserve back-end server equipment for various projects across the company.
- Company-facing IT staff need to reserve loaner equipment for employees, including laptops, displays, etc.
- Managers and marketing staff need to reserve briefing rooms, catering gear, projectors, etc.

Reservation timelines may be as brief as a few hours (e.g., a projector needed for a meeting) or as long as months or years (e.g., a test server used day-to-day by an engineer).

1 Definitions

- **Resource**: An entity that can be reserved by a user.
- **Reservation**: An entry specifying that a resource is allocated to a user for a specified interval of time.
- **Tag**: A small piece of text used to flexibly describe a resource, e.g. “laptop”, “classroom”, “server”, etc.
- **Overlapping reservations**: Reservations which intersect in time interval. Note that two reservations where one start time equals the other’s end time are *not* considered overlapping.
- **Resource management permission**: A system-wide permission that grants the ability to create, delete, and manage resources.
- **Reservation management permission**: A system-wide permission that grants the ability to modify or delete *any* reservation.
- **User management permission**: A system-wide permission that grants the ability to create, delete, and manage users and groups.
- **View access**: A per-resource permission that grants the ability to view the resource without allowing reservation of it.
- **Reserve access**: A per-resource permission that grants the ability to reserve the resource.

2 Requirements

1. Server
   
   (a) Your software must have a server that supports an arbitrary number of users.
   
   (b) During the install/setup process, a special user named “admin” configured.
Resource Tracker Evolution 2

(c) Users must have their accounts created by the admin user before being able to use the system. The system shall make use of the Duke NetID system to allow all users to login using their Duke credentials. The special local “admin” account remains, and retains full permissions. Support for other “local” (non-NetID) user accounts is optional.

(d) Any stored passwords must be kept in a secure manner (e.g., salted + hashed)

(e) All communication between the clients and server must be encrypted.

(f) The server must maintain state in a persistent fashion.

2. Client: Basic resource tracking functionality

(a) The admin user A user with resource management permission shall be able to create resources, which include name, description, and zero or more tags (see definitions above). Such users may also manage resource permissions (see below).

(b) The admin user A user with resource management permission shall be able to modify resources in any way, as well as delete resources. The user shall be warned before deleting a resource with a current or future reservation.

(c) A user shall be able to view the list of resources over time.
   i. Users shall be able to filter the view with a set of required and/or excluded tags. The system will make apparent the selection of tags available.
   ii. Users shall be able to set the time span being displayed. The system must be able to cope with large time spans, both in terms of performance and visual clarity.
   iii. The resulting view will show upcoming reservations on the resources in an efficient and intuitive manner, including the identity of the holder of each reservation.
   iv. Resources that the user does not have permission to view shall not be visible in any way.

(d) A user with requisite permission shall be able to reserve a resource, providing a start time/date and end time/date for the reservation. For the reservation to be granted, no other reservations must overlap the requested one.

(e) A user shall be able to modify or delete any of their reservations, provided that such changes do not cause a disallowed overlap in reservation. The admin user A user with reservation management permission shall be able to modify or delete any reservation, provided that such changes do not cause a disallowed overlap in reservation.

(f) The system shall send email reminders of the start or end of upcoming reservations.

(g) Optional: Users shall be able to disable email reminders either globally or for specific reservations.

3. Groups and permissions

(a) A user with user management permission shall be able to create/delete groups, assign users to be members of groups, and set system-wide permissions for users and groups. A user can be a member of zero or more groups.
(b) The system shall track *system-wide permissions* which will control the ability to (1) create and manage resources ("resource management permission"), (2) create and manage groups and grant system-wide permissions ("user management permission"), and (3) manage reservations by viewing, modifying, or deleting reservations they do not own ("reservation management permission"). Such permissions can be granted to users and groups.

(c) The system shall track *resource permissions* for each resource. There shall be two levels of access: *view access* and *reserve access* (see definitions above). Such permissions can be granted to zero or more users and groups independently.

4. API:

(a) Every interaction described in these requirements must also be achievable via a well-documented network-based API.

(b) A simple API debugger tool must be available which allows manual testing of every API call supported in a transparent way.