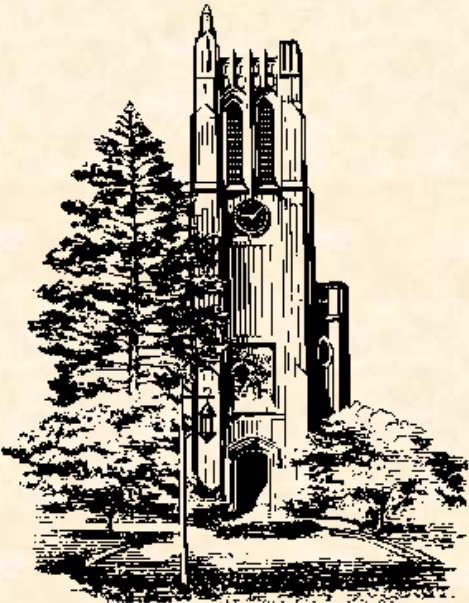# Technical Specification / Schedule Specimen Tracking

Team 8: College of Human Medicine
CSE 498, Collaborative Design

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Current Methodology

- Terrible
  - All done by hand.
    - Paper lists of specimen information.
    - Boxes of Patient data sheets.
  - Incredibly repetitive.
    - Must be redone for every order, even if information requested is the same.
  - Slow
    - Can take days to get information that a database would provide in seconds.

Project Overview

- Specimen Position-
  - Freezer, Shelf, Rack, Position within Rack.
- Check In/Out-
  - Ability for researcher to check in/check out specimens.
- Searching
  - Ability for researcher to search for a subset of all specimens with various characteristics.
    - i.e. Specific to a patient
    - From a specific trimester.
    - All samples who received a specific test.
- Ease of Use-
  - Researcher must be able to interface quickly and easily with application, so the system does not effect efficiency of researcher.
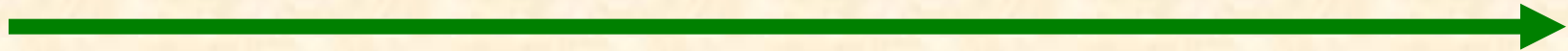
Architecture Components

- Hardware Platforms
  - Dell Axim X51
  - Dell Opti-plex 2.8 GHz, P4
  - Grabba T-6420 Barcode Scanner
  - Grabba T-6003 RFID Scanner
- Software Platforms / Technologies
  - Ruby on Rails
  - MySQL
  - PHP, JavaScript, Apache…
  - SVN for Version Control

Protocols

- **Barcode Protocol**
  - Code 39
    - Machine Readable format of information in a visual format on a surface.
    - A Barcode Symbology, Uppercase letters, 0-9, special characters. Originally had 39 characters but now has 43.

- **RFID Protocol**
  - Texas Instrument TIRIS
    - Object that can be attached to or incorporated into a product, person, or animal, for the purpose of identification using radio waves.
   - Self Adapting transponders with frequency from 129-140 kHz

Database Schema

- User-
  - Separated into Authenticated User and Guest
  - Name- First, MI, Last
  - Username, Password
  - Date of Birth
  - Email Address
- Authenticated User-
  - Represents Users, with permissions from Administrator.
- Guest-
  - Represents Users, without permissions from Administrator.

- Case-
  - Represents one mailed in sample set, may contain >1 sample.
  - But always tied to only one patient.
- Sample-
  - Actual Specimen.
- Patient-
  - Individual who donates specimen for testing.
- Medical Record-
  - Relevant information about a given patient.

EER Diagram of Database
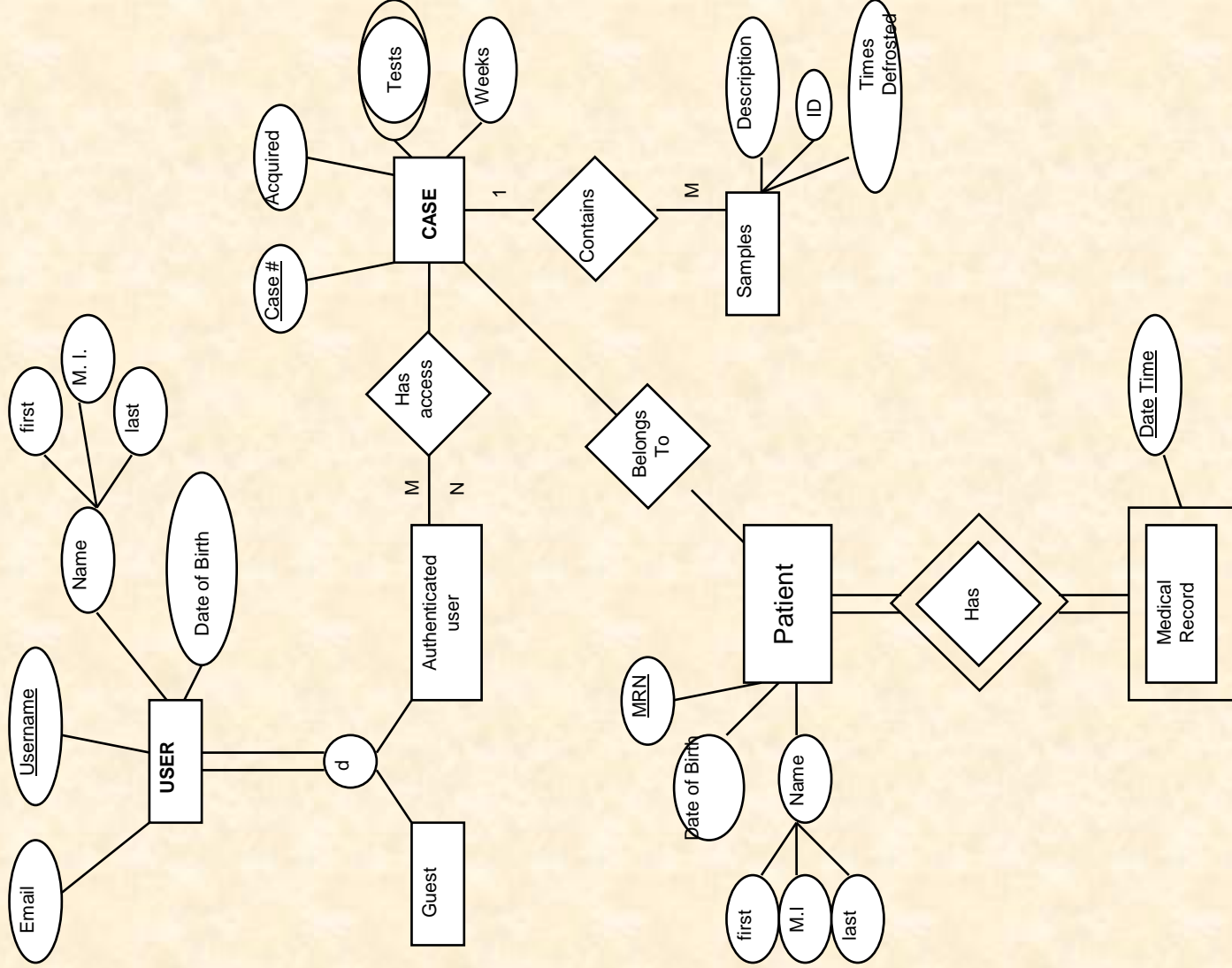
Interfaces

- PDA Interface
- Lower Resolution
- Fewer Capabilities
- Ability to Check In/Out

MSUCHM Cold Storage Inventory System **PDA version**

My Available tasks user: administrator

Search | Check Ou | Check In

Search
Scan an item at any time or search by sample ID #

Search

Interfaces (cont'd)

- PC Interface
- Higher Resolution
- More Capabilities

MSUCHM Cold Storage Inventory System   **PC version**

My Available Tasks: logged in as: administrator   [log out]

| Search samples | Add new sample | Look up patient info | Administrative options |

Search Samples

Scan a barcode any time or search by information...

Sample ID #:

Freezer #:
(any)

Last date checked out:

Patient ID #:

Tray #:
(any)

Last date checked in:

Patient last name:

Position #:

Currently checked out by user:

Patient first name:

Last checked out by user:

Specimen type:
(any)

Search

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Risks

- RFID Wild Card
  - How exactly RFID reader reacts with tags.
  - We still don't have tags, but we do have the reader.
- CSE Network Failures
  - Despite scheduled meetings difficult to work on web application without the web.
- Scheduling Conflicts.
  - Our schedules are really different.
- Our major client contact
  - Our example user, is difficult to contact, and rarely has time for discussion.

Pearl Methodology

- As requested by Dr. Punch, we are going to be developing this as a pearl. Start with something brutally simple, and just add features.
  - Constantly checking with our client contact to make sure that we are still on course.
- Divided into 3 major phases.
  - Phase I: Skeleton of System
    - Basic Patient/Sample Registration.
    - Check In/Out of samples.
    - Database to keep track of all relevant information.

Pearl Methodology (cont'd)

– Phase II
  - Additional Features:
    – Searching based on specific criteria
      » Patient, Test, Age, etc.
    – History Creation
      » Monitor all dynamic data relevant to a specimen.
– Phase III
  - Additional Features:
    – Monitoring
      » Specimens, Patients, Other Researchers etc.
    – Email Alerts
      » Email me when some set of events occur.

Project Schedule

1. Technical Specification
   a) Goal: Brief, 10-20 page, Technical Spec.
   b) Date: 01/28/07

2. User Registration/Login
   a) Goal: Register Users, so only registered users can login.
   b) Date: 01/28/07

3. Patient Registration
   a) Goal: Ability to input patient information.
   b) Date: 02/03/07

4. Physical Medium
   a) Goal: Build all racks, and create specimens.
   b) Date: 02/03/07

Project Schedule

5. Input Data
   a) Goal: Input all information (patient & specimen), to create database.
   b) Date: 02/10/07
6. Phase I
   a) Goal: Skeleton of System. Basic Functionality.
   b) Date: 02/15/07
7. Demo I
   a) Goal: Check In/Out, Review PDA use with Client.
   b) Date: 02/19/07
8. Phase II
   a) Goal: Additional Features including Searching, History Creation.
   b) Date: 03/15/07

Project Schedule

9. Demo II
   a) Goal: Search Features, Serious Debugging.
   b) Date: 03/19/07

10. Email Stuff
    a) Goal: Set up our system so that it can send emails.
    b) Date: 03/28/07

11. Phase III
    a) Goal: Additional Features. (Emailing, Watch Protocol)
    b) Date: 04/05/07

12. Demo III / Video
    a) Goal: Record/Edit Final Video.
    b) Date: 04/09/07 ~ 04/23/07