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## Data Types:

### Users

Attribute	Data type	Nullable
username	String	Not Null
name	String	Not Null
password	String	Not Null

### Individuals

Attribute	Data type	Nullable
job_title	String	Not Null
hire_date	Date	Not Null

#### Municipalities

Attribute	Data type	Nullable
category	String	Not Null

#### Government Agencies

Attribute	Data type	Nullable
agency_name	String	Not Null
local_office	String	Not Null

#### Companies

Attribute	Data type	Nullable
headquarters	String	Not Null
number_of_employees	Integer	Not Null

#### Resources

Attribute	Data type	Nullable
id	Integer	Not Null
owner	String	Not Null
name	String	Not Null
home_location_latitude	Float	Not Null
home_location_longitude	Float	Not Null
model	String	NULL
cost	Float	Not Null

cost_per	String	Not Null
max_distance	Integer	NULL
capabilities	List<String>	NULL
primary_esf	String	Not Null
additional_esf	List<String>	NULL
return_date	Date	Not Null
status	String	Not Null

## Incidents

Attribute	Data type	Nullable
id	String	Not Null
owner	String	Not Null
date	Date	Not Null
description	String	Not Null
declaration	String	Not Null
additional_declarations	List<String>	NULL
location_latitude	Float	Not Null
location_longitude	Float	Not Null

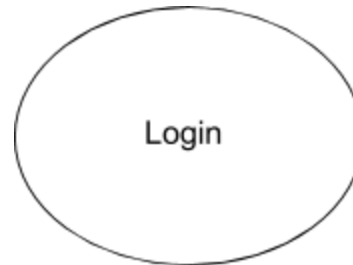
**Business Logic Constraints:**

- There is no interface for registering new users
- If the user provides invalid login credentials, an error message should be displayed and the user should be returned to the login screen.
- It is possible that multiple users will have an incident with the same (or similar) names if the incident is widespread affecting many municipalities. But each will have a different owner.

- If all search fields are left blank, ERMS will return all resources currently in the system.
- The keyword field searches for matching substrings in the **name**, **model**, and **capabilities** fields.
- Multiple search criteria will be ANDed together.
- You cannot request a resource without first selecting an incident
- Multiple requests may be queued up for the same resource, however, a resource may only be deployed to respond to one incident at a time.
- For resources owned by the current user it is permissible to perform a “hidden request” followed by an immediate deployment.

## **Login:**

Task Decomposition



**Lock Types:** Read-only on User table

**Number of Locks:** Single

**Enabling Conditions:** None

**Frequency:** low frequency with spikes during emergencies which may total thousands or tens of thousands or hundreds of thousands depending on the size of the event.

**Consistency (ACID):** not critical, order is not critical

**Subtasks:** Mother Task is not needed. No decomposition needed.

Abstract Code

- User enters *username*, *password* input fields.
- If data validation is successful for both *username* and *password* input fields, then:
  - When **Login** button is clicked:
    - If User record is found but password does not match or username does not match:
      - Return to **Login** form with error message.
    - Else:
      - Store username information as session variable.
      - Go to **Main Menu**
- Else username or password input fields are invalid, display **Login** form, with error message.

## Main Menu:

### Task Decomposition

**Lock Types:** Lookups of Municipality category; Government Agency agency name; Companies headquarters and number of employees for username. All are read-only.

**Number of Locks:** User schema construct is needed

**Enabling Conditions:** Enabled by a user's login

**Frequency:** Once per logged in user

**Consistency (ACID):** not critical, order is not critical.

**Subtasks:** Mother Task is not needed. No decomposition needed.

### Abstract Code

- Run the **Main Menu** task: query for information about the user where \$username is the ID of the current user.
  - Show User username
- Find the Municipality category of username as applicable.
  - Show Municipality category as applicable.
- Find the Government Agency agency name of username as applicable.
  - Show Government Agency agency name as applicable.
- Find the Companies headquarters and number of employees of username as applicable
  - Show Companies headquarters and number of employees as applicable.
- Click **Add a Resource** hyperlink - Jump to **Add new resource** form.
- Click **Add Emergency Incident** hyperlink - Jump to **Add new incident** form.
- Click **Search Resources** hyperlink - Jump to **Search Resources** form.
- Click **Resource Status** hyperlink - Jump to **Resource Status** form.
- Click **Resource Report** hyperlink - Jump to **Resource Report** form.
- Click **Exit** button - Invalidate login session and go to **Login** form.

## Add Resource:

### Task Decomposition



Add Resource

**Lock Types:** Lookup from ESF table; Cost\_per table,

Write to Resources tables for NewResource

**Number of Locks:** Several different schema constructs are needed

**Enabling Conditions:** Enabled from Users choice from **Main Menu**

**Frequency:** Undetermined

**Consistency (ACID):**

**Subtasks:** All tasks must be done, but can be done in parallel. Mother task is required to coordinate subtasks. Order is not necessary.

### Abstract Code

- User clicked on **Add Resource** hyperlink from **Main Menu**:
- Click **Cancel** button - Return user to **Main Menu**:
- Run the **Add a Resource** task: assign Resource owner the value of the logged in user
  - Display Resource owner
- User enters *resource\_name* input field.
- Find and display ESF list
  - User enters primary\_esf input field.
- Display ESF list minus primary\_esf
  - User enters secondary\_esf input field as applicable.
- User enters model input field as applicable
- User enters capabilities list input field as applicable
- User enters the home\_location\_latitude input field.
- User enters the home\_location\_longitude input field.
- User enters the max\_distance input field as applicable.
- User enters the cost input field as a positive value in US dollars.
- Find and display Resource cost\_per list
- User enters cost\_per input field.
- Click **Save** button - Resource is assigned a unique numerical ID. Below information is validated before storing the resource information into the database:
  - All required fields are filled in.
  - The dollar amount is not negative
  - Latitude and Longitude fields contain valid coordinates



## Add Emergency Incident:

Task Decomposition

**Lock Types:** Lookup from incident declarations table;  
Insert to Incident table.

**Number of Locks:** Single

**Enabling Conditions:** Enabled from Users choice from Main Menu

**Frequency:** Low- Incidents are entered as they happen.

**Consistency (ACID):** incidents are private to the User and there can be multiple incidents of the same name each having a different owner.

**Subtasks:** the current User is stored as the owner. A task is needed to retrieve the current User from a session variable. Task to Insert Incident that assigns unique Id and combines the abbreviation of the incident type with generated unique id.



Abstract Code

- User clicked on **Add Incident** hyperlink from Main Menu:
- Click **Cancel** button - Return user to **Main Menu**:
- Run the **Add an Incident** task: assign Incident owner the value of the logged in user
- Find and display Incident Declaration list.
  - User selects the Incident declaration from list
- User enters the date into input fields.
- User enters a description of the incident into input fields.
- User enters the location Latitude and Longitude into input fields.
- When **Save** button is clicked run Insert Incident task.

## Search Resources:

Task Decomposition

**Lock Types:** Lookup from ESF table; Incident declarations table

**Number of Locks:** single lock on Resources entity

**Enabling Conditions:** triggered when User clicks Search Resources on Main Menu.

**Frequency:** low to very high frequency depending on how many current incidents are driving the number of searches

**Consistency (ACID):** consistency is important as the User needs to be viewing accurate information.

**Subtasks:** There is a Mother task that will retrieve Resource name, model, and capabilities and kick off other tasks. There is a need for a subtask that will calculate the distance in radius of a Resource from an Incident. There is need for subtasks to retrieve data and display the Search



Results form. Tasks are needed for Request and Deploy functionality. All tasks are run upon the User choosing the **Search** button on the Search Resources Form.

#### Abstract Code

- User clicked on **Search Resources** hyperlink from **Main Menu**:
- Click **Cancel** button - Return user to **Main Menu**:
- Find and display ESF list.
- Find and display a list of Incidents
- User leaves blank or enters a Keyword for name, model, or capability of Resource in input field.
- User selects none or selects an ESF.
- User leaves blank or selects an Incident.
  - If user selects an Incident, user selects a Kilometer value for the location.
- User clicks on **Search** button to initiate search for Resources.
  - If all fields are left blank:
    - Run **Search for Resources by all** task
    - Return all ERMS resources currently in the system
  - Else if only Keyword is chosen:
    - Run **Search for Resources by keyword** task
    - Return resources containing the keyword(s) taken from resource name, model, and capabilities attributes.
  - Else if only ESF is chosen:
    - Run **Search for Resources by ESF** task:
    - Return resources by ESF
  - Else If only an incident value is chosen (with Location value):
    - Run **Search for Resources by proximity** task
    - Calculate distance and return resources within the desired radius from the Incident.
  - Else if multiple search criteria:
    - Task results should be ANDed together.
  - Return **Search Resources Result Form**.

### Search Resources Results:

#### Task Decomposition



**Lock Types:** Lookup from Resources home location read-only

**Number of Locks:**

**Enabling Conditions:** triggered when User clicks **Search** button from Search Resources form

**Frequency:** equivalent to Search Resources task.

**Consistency (ACID):** consistency is important as the User needs to be viewing accurate information.

**Subtasks:** A single task is required for output to Search Results form.

#### Abstract Code

- User clicked on **Search** button from **Search Resources**:
- Run the Search Results task
- If User chooses the **Close** button, close the form and go back to the **Main Menu**:
- If **Search by proximity** task was run:
  - Display Incident Name above the Results output table
- For each Resource found from the Search:
  - Display the **ID, name, owner, cost** and whether or not the resource is currently **in use**.
  - If **Search by keyword** task was run:
    - Display Resources where a matching substring was found from the name, model or capabilities fields.
  - If **Search by ESF** task was run:
    - Display Resources where a matching Primary ESF or Additional ESF was found.
  - If **Search by proximity** task was run:
    - Lookup Incident Location Latitude and Longitude values
    - Lookup Resources home location Latitude and Longitude values
    - Calculate the distances from the Incident to Resources
  - If any combination of tasks were run display output of all tasks that were run
  - Lookup Deployed state of Resource
    - If Resource is owned by the current user AND the Resource is NOT currently in use, then **Deploy** button is displayed in the Action column.
    - Else, **Request** button will be displayed in the Action column.
    - If Resource is NOT currently in use, then display AVAILABLE in the Status column and NOW in Next Available column.
    - Else, display IN USE in the Status column.
      - Lookup Expected Return date list

- Determine the latest date from that list
  - Display the latest Expected Return date in the Next Available column.
- Sort Resources, first by distance from shortest to longest, then alphabetically.
- Display Resources that have calculated distances equal to or less than the Requested Location distance with the calculated distance value in the Distance column of the results table.
- For any **Deploy** button shown in the Action column:
  - Do nothing
- For any **Request** button shown in the Action column:
  - Do nothing
- Upon **Deploy** button being chosen by the user:
  - Display Resource Deployed Form
    - User Input: Resource Expected Return Date
    - Display Resource Status as Available
    - Display Resource name
    - Display Incident description
  - If User chooses the **Cancel** button, close the form and go back to the **Search Resource Results**:
  - Validate the current user owns the Resource
  - Validate the Resource status is Available
  - If User chooses the **Deploy Resource to Incident** button, close the form and go back to the **Search Resource Results**:
    - Run the **Resources currently in use** task.
      - Store Resource Status value as IN USE
      - Store Resource Expected Return Date value provided by user
      - Store Resource Start Date value as today's date
    - Display updated status value in Status column for the requested resource
    - Display updated Expected Return date value in Next Available column for the requested resource
    - Run the **Resource Requests received by me** task.
- Upon **Request** button being chosen by the user:
  - Display Resource Request Form
    - Lookup all existing Resource Requests for this resource
    - Display all existing Resource Requests for this resource
    - User Input: Resource Expected Return Date
    - Display Resource Status as Available
    - Display Resource name
    - Display Incident description
  - If User chooses the **Cancel** button, close the form and go back to the **Search Resource Results**:
  - If User chooses the **Request Resource to Incident** button:
    - Run the **Resources Requested** task.

- Display popup window “Resource has been requested”
  - User chooses “OK” to close the popup window
- Resource Request Form is closed.
- go back to the **Search Resource Results** form:

## Resource Status:

### Task Decomposition

**Lock Types:** one read only on Incident and one read on Resources.

**Number of Locks:** 2

**Enabling Conditions:** Status is available when User clicks return on Resource Status form. Status is deployed when user clicks on deploy in the Resource Deployed form.

**Frequency:** Varies from low to high frequency depending on the current number and size of incidents and resources needed.

**Consistency (ACID):** consistency is critical as Users will need accurate timely status of Resources.

**Subtasks:** Set the deployed status when deployed, set available status when Resource is created or returned. Several subtasks including Resources currently in use, Resources Requested, Resources Requests received, Users Response to Resource Request.

### Abstract Code

- User clicked on **Resource Status** hyperlink from **Main Menu**:
- If User chooses the **Close** button, close the form and go back to the **Main Menu**:
- Run **Resources currently in use** task.
- Run **Resources Requested** task.
- Run **Resource Requests received** task.
- Run **Users Response to Resource Request** task.
- For each Resource found from **Resources currently in use**:
  - For each Incidence owned by the current user:
    - Display the **ID, name, incident responding to, and owner**.
    - Display **Return** button in the Action column.
- For each Requested Resource found from **Resources Requested**:
  - If Resource Request has NOT been responded to:
    - Display the **ID, name, related incident and owner** for the current user only.
    - Display **Cancel** button in the Action column.
- For each Requested Resource found from **Resource Requests received**:
  - If user has NOT responded to Resource Request:

- Display the **ID, name**, related **incident** and **requesting user**.
  - Display **Reject** button in the Action column.
  - If Requested Resource has Available Status
    - Display **Deploy** button in the Action column
- For any **Return** button shown in the Action column:
  - Do nothing
- For any **Cancel** button shown in the Action column:
  - Do nothing
- For any **Deploy** button shown in the Action column:
  - Do nothing
- For any **Reject** button shown in the Action column:
  - Do nothing
- Upon **Deploy** button being chosen by the user:
  - Display Resource Deploy Form
    - User Input: Resource Expected Return Date
    - Display Resource Status as Available
    - Display Resource name
    - Display Incident description
  - If User chooses the **Cancel** button, close the form and go back to the **Resource Status**:
  - Validate the current user owns the Resource
  - Validate the Resource status is Available
  - If User chooses the **Deploy Resource to Incident** button, close the form and go back to the **Resource Status**:
    - Run the **Resources currently in use** task.
      - Store Resource Status value as IN USE
      - Store Resource Expected Return Date value provided by user
      - Store Resource Start Date value as today's date
  - Lookup and Display Resources in use
  - Run **Resource Requests Received** task:
    - Lookup and Display Resource Requests Received.
- Upon **Reject** button being chosen by the user:
  - Run **Return Resource to available status** task
    - Modify Resource Status from in use to Available
    - Lookup and Display Resources in use
  - Run **Resource Requests received** task:
    - Delete Requested Resource
- Upon **Cancel** button being chosen by the user:
  - Run **Resource Requests received** task:
    - Delete Requested Resource
- Upon **Return** button being chosen by the user:
  - Run **Return Resource to available status** task:
    - Modify Resource Status to Available

## Resource Request:

Task Decomposition

**Lock Types:** read, write on Resources

**Number of Locks:** two

**Enabling Conditions:** Request button clicked from Search Resource Results form

**Frequency:** Varies from low to high frequency depending on the current number and size of incidents and resources needed.

**Consistency (ACID):** consistency is not as critical as status, but Users will need to accurately request resources.

**Subtasks:** No Mother task needed, single subtask

Abstract Code

- If User chooses the **Cancel** button, close the form and go back to the Search Resources Results form.
- Lookup all existing Resource Requests for this resource
- Display all existing Resource Requests for this resource
- User Input: Resource Expected Return Date
- Display Resource name
- Display Incident description
- If User chooses the **Request Resource to Incident** button:
  - Run the **Resources Requested** task.
  - Display popup window "Resource has been requested"
    - User chooses "OK" to close the popup window
  - Resource Request Form is closed.
  - go back to the **Search Resource Results** form:

## Resource Deployed:

Task Decomposition

**Lock Types:** read, write on Incident and Resource

**Number of Locks:** 2

**Enabling Conditions:** user clicks on Deploy button on Search Resource Results form or Resource Status form.

**Frequency:** Varies from low to high frequency depending on the current number and size of incidents and resources needed.

**Consistency (ACID):** critical as this is the method by which Resources are deployed

**Subtasks:** No Mother task. 3 separate tasks get the Resource and get the Incident for display, Deploy Resource to Incident task.

Abstract Code

- If User chooses the **Cancel** button, close the form and go back to the **Resource Status** form or **Search Resources Results** form:
- Lookup all existing Resource Requests for this resource
- Display all existing Resource Requests for this resource
- User Input: Resource Expected Return Date
- Display Resource Status as Available
- Display Resource name
- Display Incident description
- Validate the current user owns the Resource
- Validate the Resource status is Available
- If User chooses the **Deploy Resource to Incident** button, close the form and go back to the **Resource Status** form or **Search Resources Results** form:
  - Run the **Resources currently in use** task.
    - Store Resource Status value as IN USE
    - Store Resource Expected Return Date value provided by user
    - Store Resource Start Date value as today's date

## Resource Report Summary:

Task Decomposition

**Lock Types:** Lookup ESF list; lookup Resources table; read-only

**Number of Locks:**

**Enabling Conditions:** Resource Report Summary hyperlink chosen from Main Menu

**Frequency:** undetermined

**Consistency (ACID):**

**Subtasks:** Mother task not needed, single subtask is sufficient

Abstract Code

- If User chooses the **Close** button, close the form and go back to the Main Menu.
- Lookup ESF list
- Lookup all resources owned by the current user



- Display list of all ESFs.
- Display total resources for each ESF
- Display total resources in use for each ESF
- Calculate and Display total resources for all ESFs
- Calculate and Display total resources in use for all ESFs

## Test Cases: (Currently at Draft Stage)

These test cases will be updated periodically through the project.

Test Case #	Area	Test Case Description
<b>L000</b>	<b>Login</b>	
L001		Login page entry (username, password) credentials
L002		Valid credentials (username, password) accepted
L003		reject invalid (username, password) when user does not exist
L004		reject invalid (username, password) when user exists, password invalid
<b>R000</b>	<b>Add Resource</b>	
R001		
R002		
R003		
R004		
	<b>Add Emergency Incident</b>	
	<b>Search Resources</b>	

	<b>Search Resources Results</b>	
	<b>Resource Status</b>	
	<b>Resource Request</b>	
	<b>Resource Deployed</b>	
	<b>Resource Report Summary</b>	