

V Group Project Deliverable 3 & 4

"Detailed Design" & "Implementation"

Group Project Topic:

Construction Management Information System

Group Name: Tech Phantoms

Team 2

Members:

Artur Komissarov

Faith-Valentine Uzoka

Khaliq Minsariya

Krushnam Badami

Kyle Rumde

Srinath Bhaskaran

Varnika Srivastava

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| Participation Marks | 50 |

| OVERALL PHASE STATUS FOR DELIVERABLE 3 | | |
|--|------------------------|-----------|
| Task 1 - Interaction Diagrams (Sequence and Collaboration) | | |
| Use Case Name | ASSIGNED TO: | STATUS |
| i) Confirm BluePrint | Faith -Valentine Uzoka | Completed |
| ii) Process Purchasing Order | Khaliq Minsariya | Completed |
| iii) Schedule Project | Srinath Bhaskaran | Completed |
| iv) Produce Progress Report | Kyle Rumde | Completed |
| v) Manage Budget | Krushnam Badami | Completed |
| vi) Tracking Equipment | Varnika Srivastava | Completed |

| SECTION | ASSIGNED TO : | STATUS |
|---|--------------------|-----------|
| 2) Domain Class Model | Artur Komissarov | Completed |
| | Krushnam Badami | |
| 3) Program Structures in Java | Artur Komissarov | Completed |
| | Krushnam Badami | |
| 4) System Complexity: a. Layers and partitions | Kyle Rumde | Completed |
| | Varnika Srivastava | |
| b. Package diagram | Kyle Rumde | Completed |

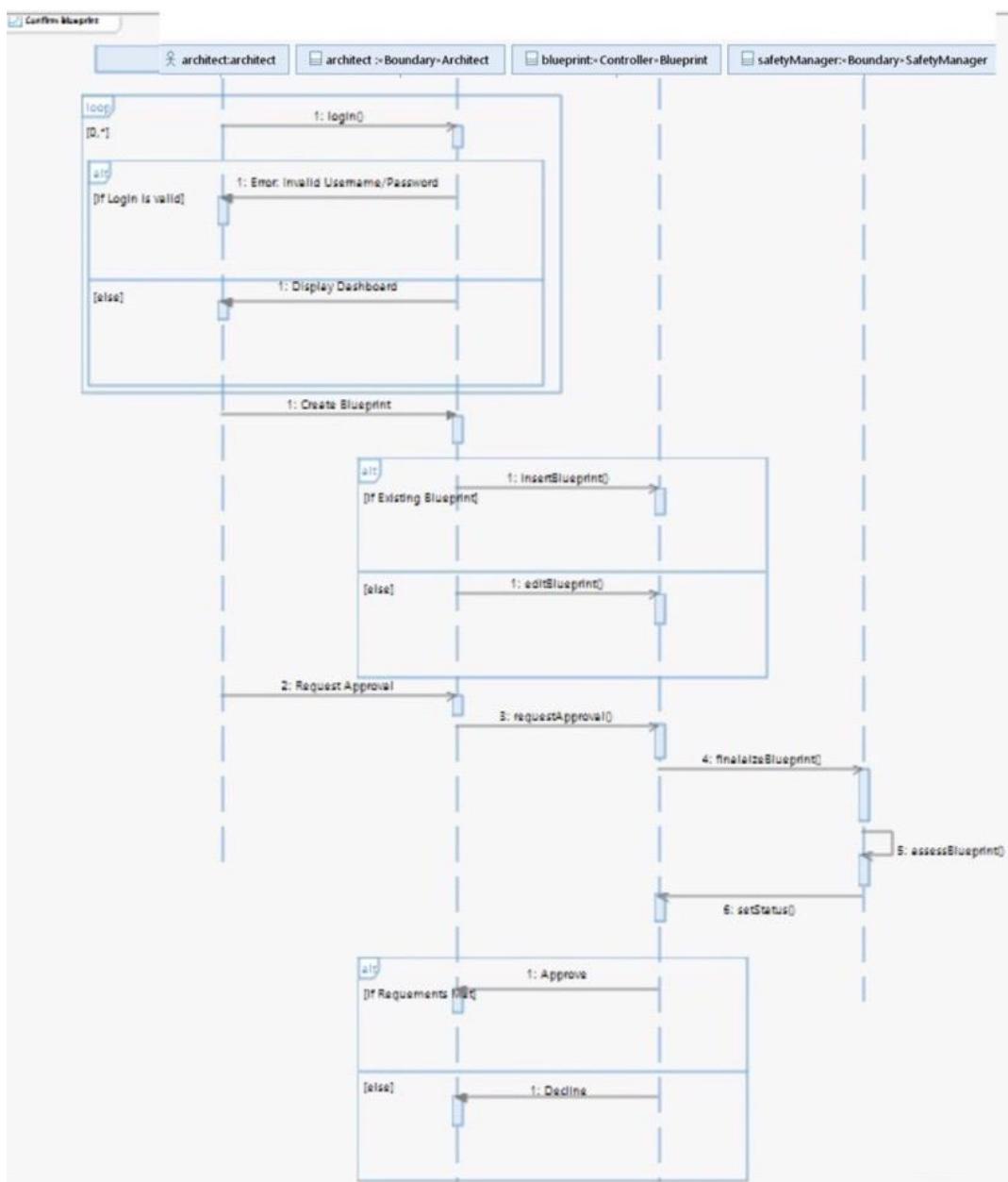
| | | |
|----------------------|--------------------|-----------|
| | Varnika Srivastava | |
| c. Component diagram | Kyle Rumde | Completed |
| | Varnika Srivastava | |
| d.Deployment diagram | Kyle Rumde | Completed |
| | Varnika Srivastava | |

| OVERALL PHASE STATUS FOR DELIVERABLE 4 | | |
|--|-------------------------|----|
| SECTION | ASSIGNEE | |
| Use Case Names: | | GU |
| i) Register Client | Faith - Valentine Uzoka | |
| ii) Confirm BluePrint | Khaliq Minsariya | |
| iii) Estimate Required Materials | Khaliq Minsariya | |
| iv) Process Purchasing Order | Khaliq Minsariya | |
| v) Schedule Project | Srinath Bhaskaran | |
| vi) Produce Progress Report | Faith - Valentine Uzoka | |
| vii) Manage Budget | Faith - Valentine Uzoka | |
| viii) Tracking Equipment | Srinath Bhaskaran | |
| ix) Infer and Analyse Data | Srinath Bhaskaran | |
| x) Report Incidents | Srinath Bhaskaran | |

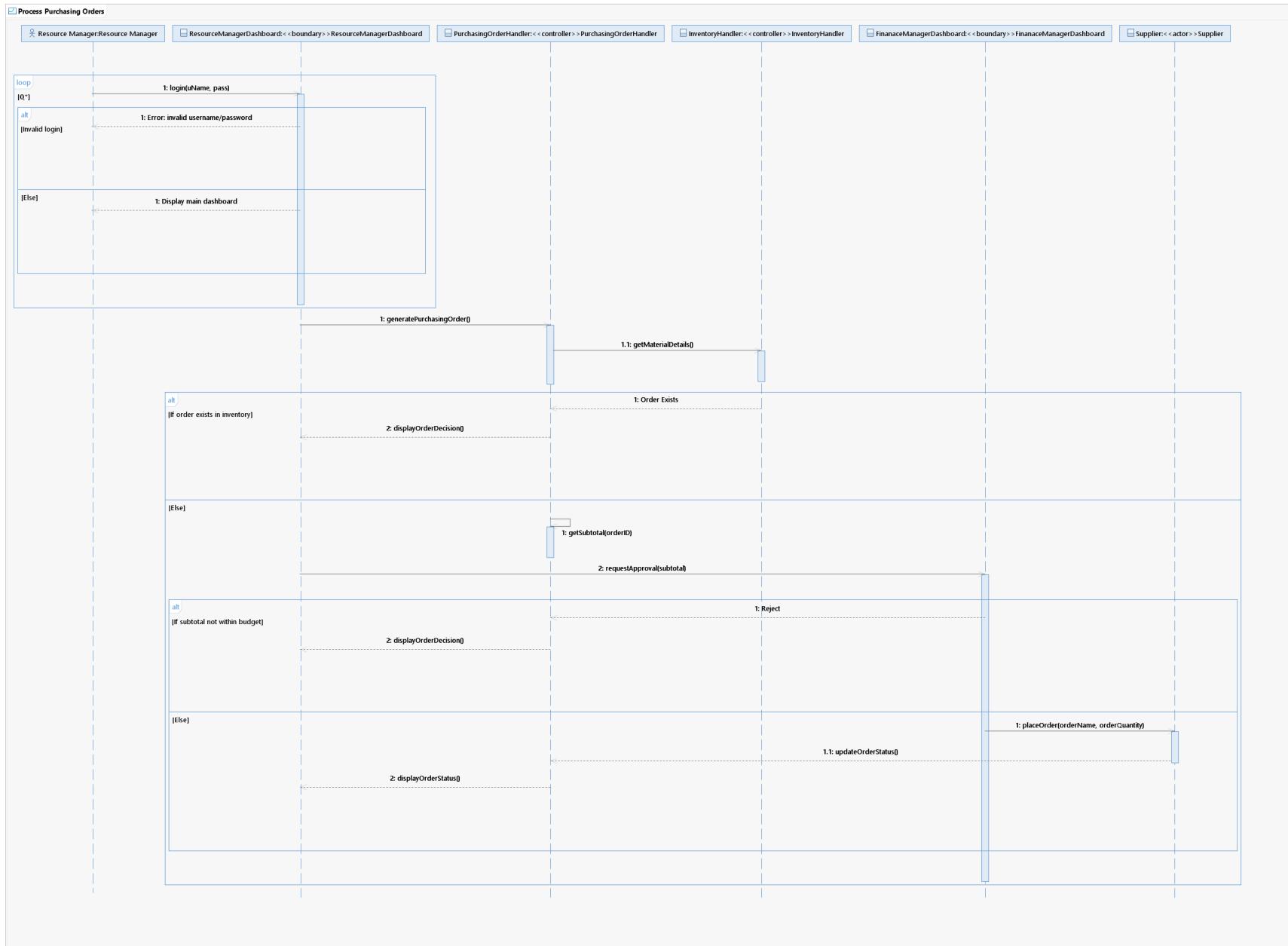
Task 1 - Interaction Diagrams (Sequence Diagrams)¹

Use Case #2: Confirm Blueprint

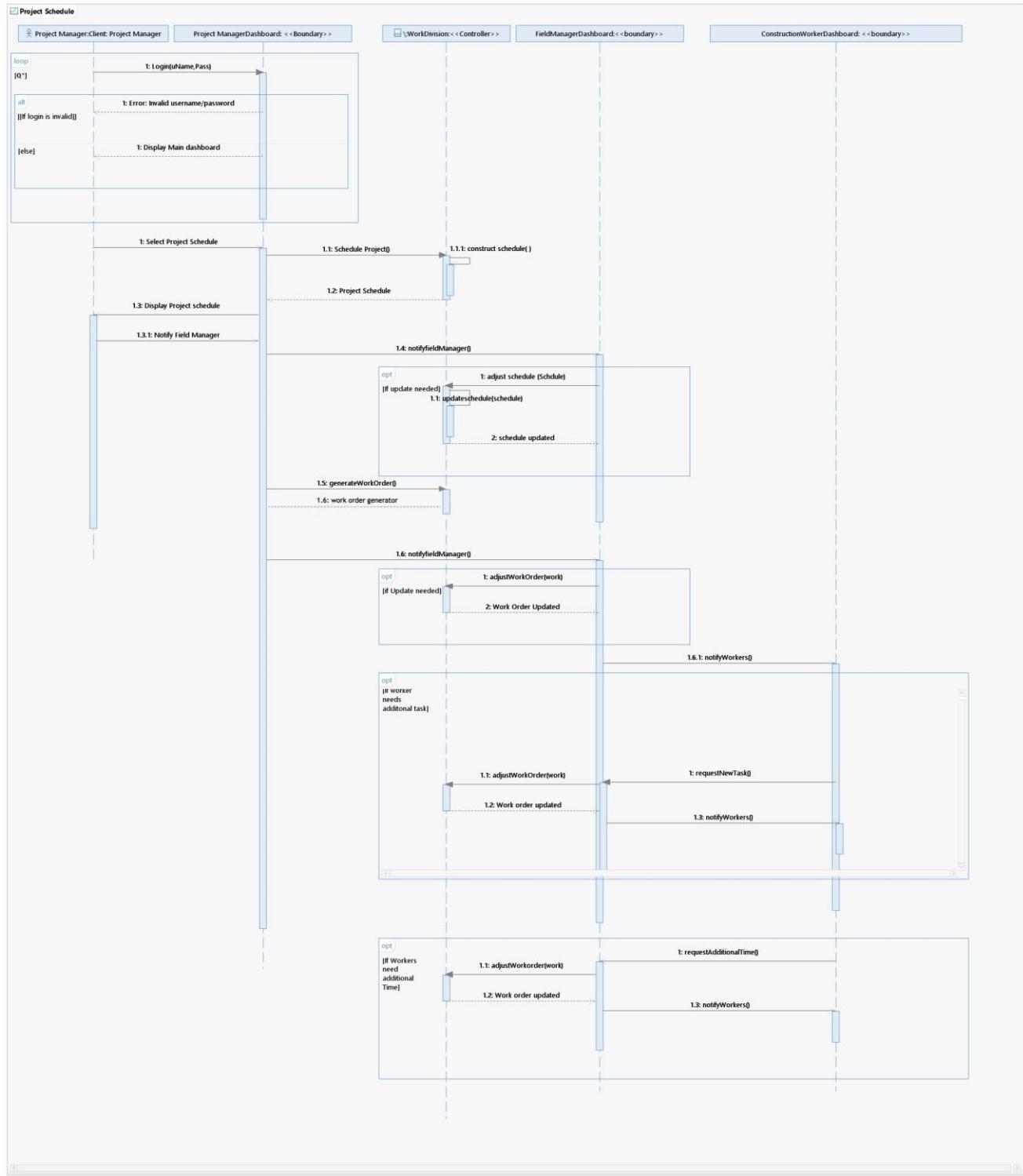
¹ Please zoom in to see the details of the sequence diagrams in terms of the arrows being pointed between the lifelines.



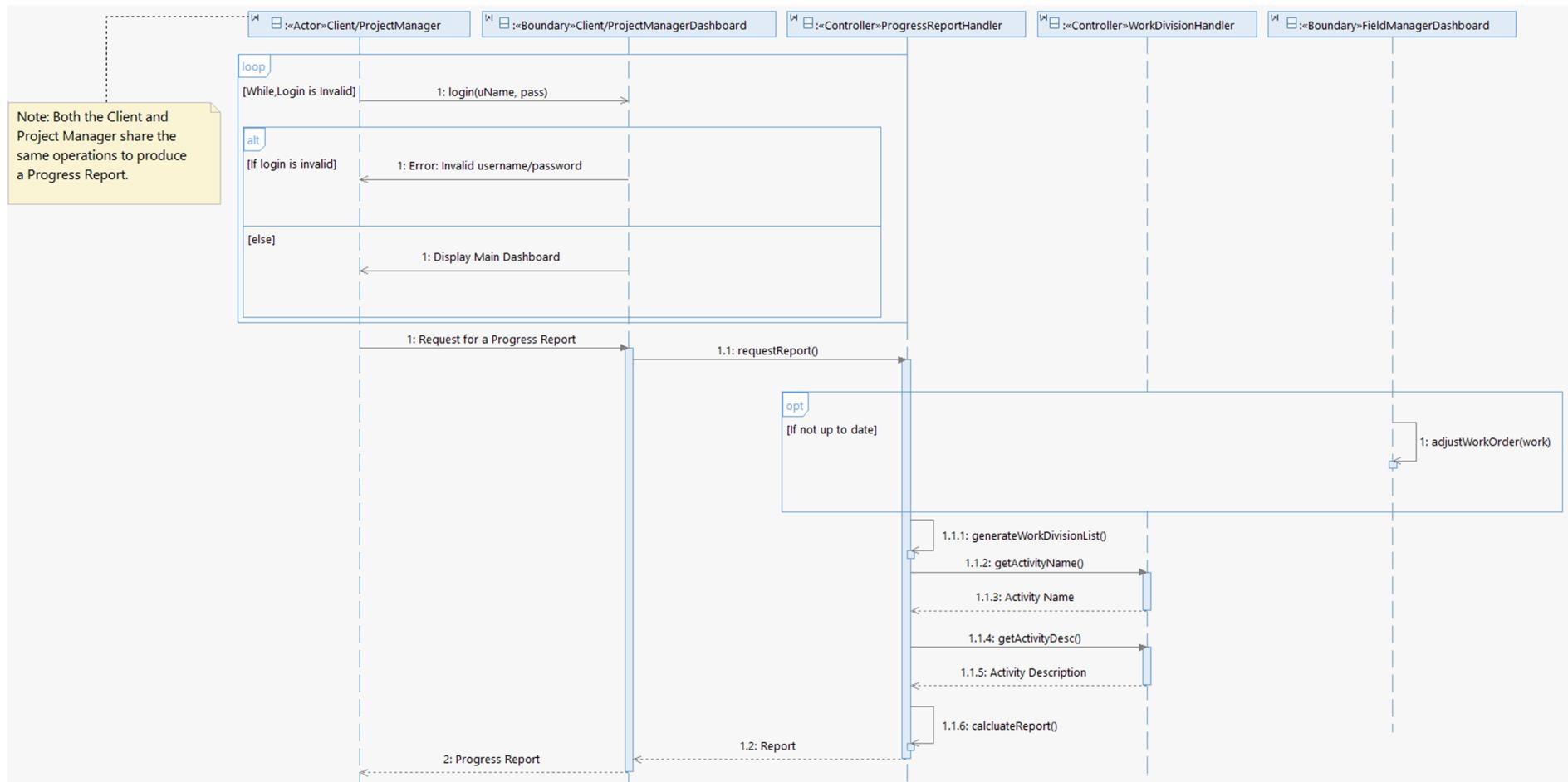
Use Case #5: Process Purchasing Order



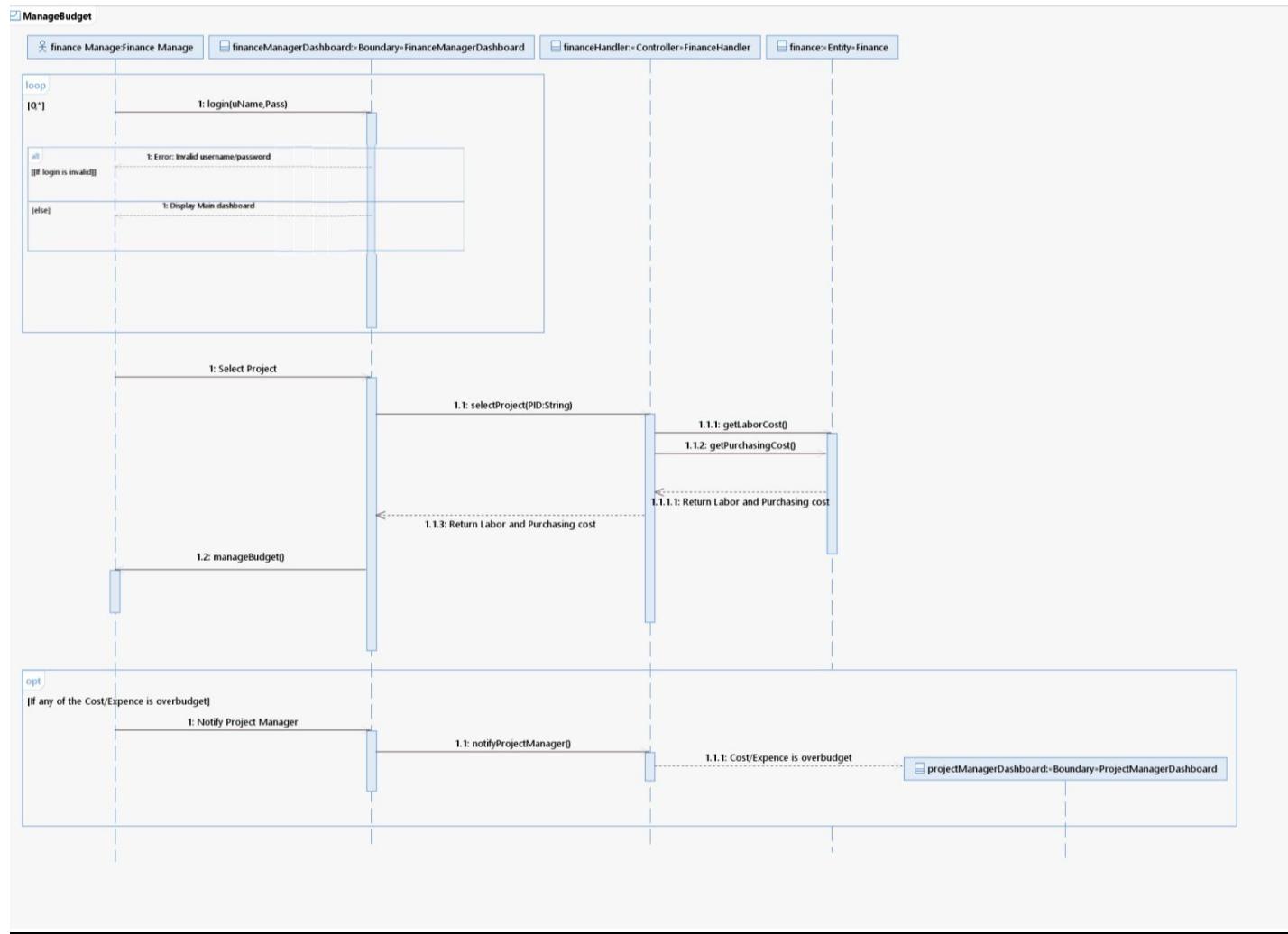
Use Case #8 Schedule Project



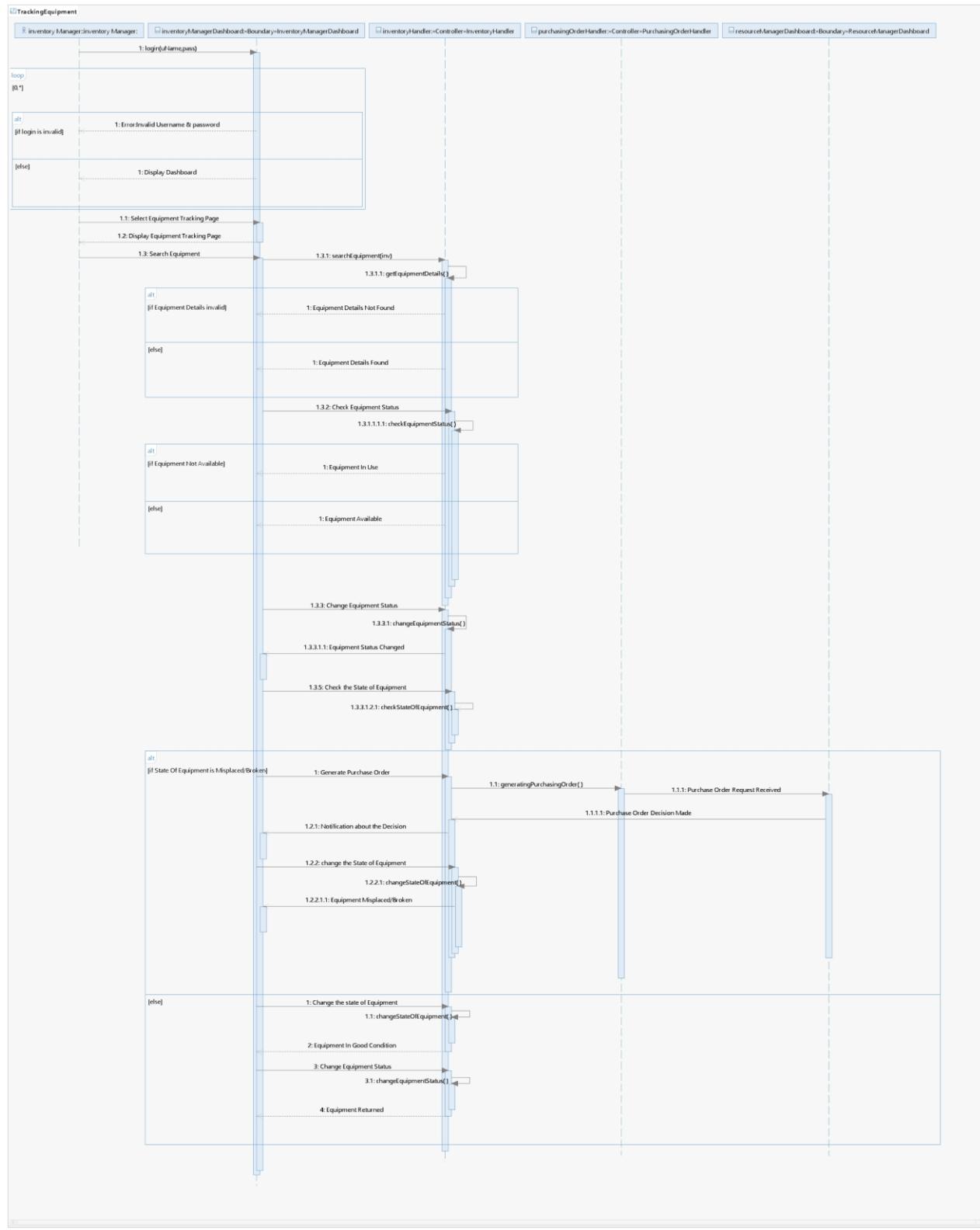
Use Case #9: Produce Progress Report



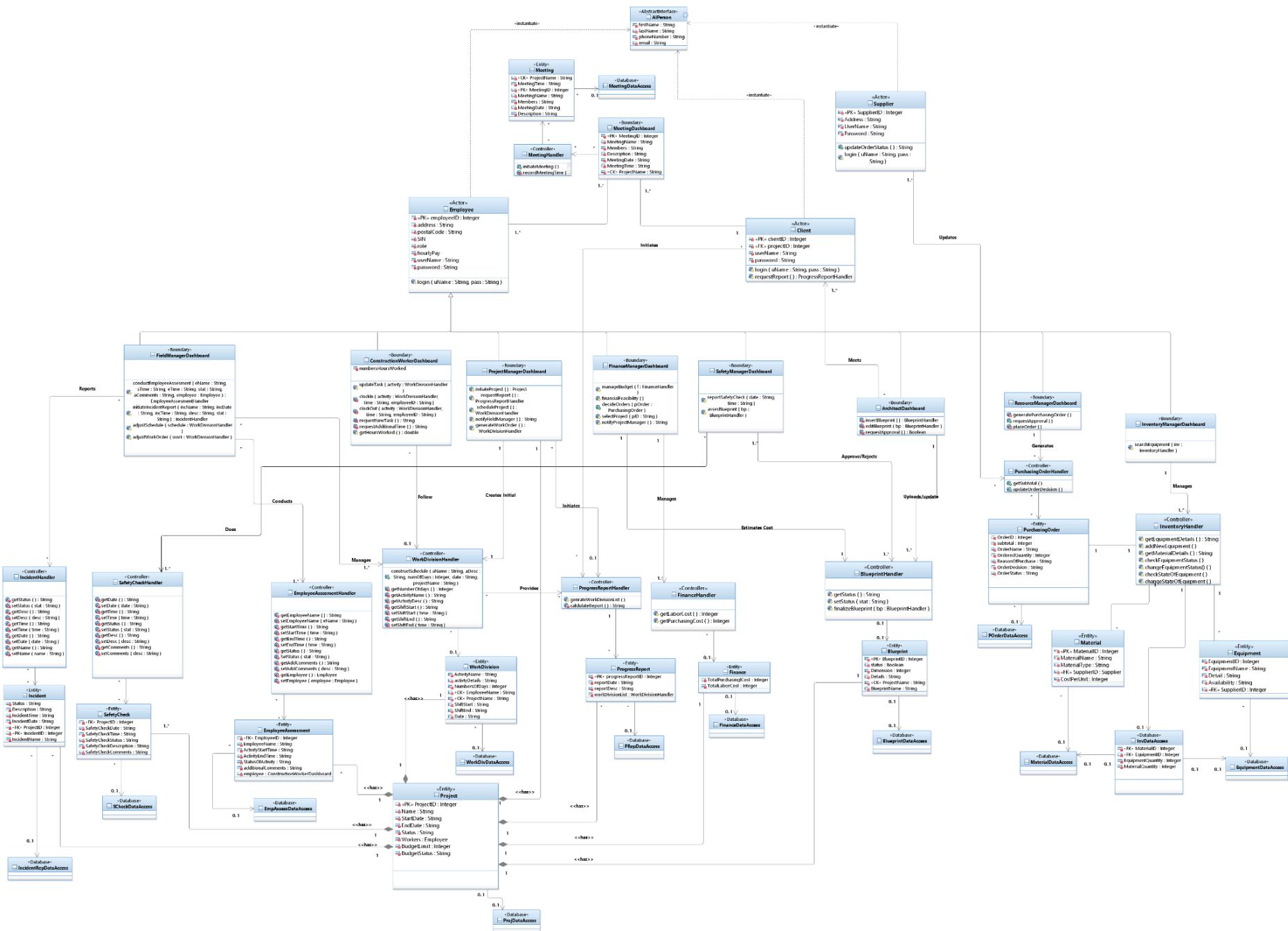
Use Case #12 : Manage Budget



Use Case #14 : Tracking Equipment



Task 2 - Design Class Diagram



Task 3 - Translation of Design Class Diagram to Java

```
AIPerson.java

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @author Krushnam
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public class AIPerson {
    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    private String firstName;

    /**
     * @return the firstName
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public String getFirstName() {
        // begin-user-code
        return firstName;
        // end-user-code
    }

    /**
     * @param firstName the firstName to set
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public void setFirstName(String firstName) {
        // begin-user-code
        this.firstName = firstName;
        // end-user-code
    }

    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    private String lastName;

    /**
     * @return the lastName
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public String getLastName() {
        // begin-user-code
        return lastName;
        // end-user-code
    }
}
```

```

APerson.java

/**
 * @param lastName the lastName to set
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public void setLastName(String lastName) {
    // begin-user-code
    this.lastName = lastName;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
private String phoneNumber;

/**
 * @return the phoneNumber
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public String getPhoneNumber() {
    // begin-user-code
    return phoneNumber;
    // end-user-code
}

/**
 * @param phoneNumber the phoneNumber to set
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public void setPhoneNumber(String phoneNumber) {
    // begin-user-code
    this.phoneNumber = phoneNumber;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
private String email;

/**
 * @return the email
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public String getEmail() {
    // begin-user-code
    return email;
    // end-user-code
}

```

```

APerson.java


    /**
     * @param email the email to set
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public void setEmail(String email) {
        // begin-user-code
        this.email = email;
        // end-user-code
    }
}


```

```

Employee.java


    /**
     * import static AIPerson.*;
     *
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @author Krushnam
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public class Employee {
        /**
         * <!-- begin-UML-doc -->
         * <!-- end-UML-doc -->
         * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
         */
        private Integer employeeID;

        /**
         * @return the employeeID
         * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
         */
        public Integer getEmployeeID() {
            // begin-user-code
            return employeeID;
            // end-user-code
        }

        /**
         * @param employeeID the employeeID to set
         * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
         */
        public void setEmployeeID(Integer employeeID) {
            // begin-user-code
            this.employeeID = employeeID;
            // end-user-code
        }

        /**
         * <!-- begin-UML-doc -->
         * <!-- end-UML-doc -->
         * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
         */
        private String address;

        /**
         * @return the address
         * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
         */
        public String getAddress() {
            // begin-user-code
            return address;
            // end-user-code
        }
    }
}


```

```

Employee.java

}

/**
 * @param address the address to set
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public void setAddress(String address) {
    // begin-user-code
    this.address = address;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
private String postalCode;

/**
 * @return the postalCode
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public String getPostalCode() {
    // begin-user-code
    return postalCode;
    // end-user-code
}

/**
 * @param postalCode the postalCode to set
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public void setPostalCode(String postalCode) {
    // begin-user-code
    this.postalCode = postalCode;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
private Object SIN;

/**
 * @return the SIN
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public Object getSIN() {
    // begin-user-code
    return SIN;
}

```

```

Employee.java

        // end-user-code
    }

    /**
     * @param SIN the SIN to set
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public void setSIN(Object SIN) {
        // begin-user-code
        this.SIN = SIN;
        // end-user-code
    }

    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    private Object role;

    /**
     * @return the role
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public Object getRole() {
        // begin-user-code
        return role;
        // end-user-code
    }

    /**
     * @param role the role to set
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public void setRole(Object role) {
        // begin-user-code
        this.role = role;
        // end-user-code
    }

    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    private Object hourlyPay;

    /**
     * @return the hourlyPay
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public Object getHourlyPay() {
        // begin-user-code

```

```

Employee.java

    return hourlyPay;
    // end-user-code
}

/**
 * @param hourlyPay the hourlyPay to set
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 *
public void setHourlyPay(Object hourlyPay) {
    // begin-user-code
    this.hourlyPay = hourlyPay;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 *
private Project projects;

/**
 * @return the projects
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 *
public Project getProjects() {
    // begin-user-code
    return projects;
    // end-user-code
}

/**
 * @param projects the projects to set
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 *
public void setProjects(Project projects) {
    // begin-user-code
    this.projects = projects;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 *
private Set<MeetingDashboard> meeting;

/**
 * @return the meeting
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 *
public Set<MeetingDashboard> getMeeting() {

```

```

Employee.java

    // begin-user-code
    return meeting;
    // end-user-code
}

/**
 * @param meeting the meeting to set
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public void setMeeting(Set<MeetingDashboard> meeting) {
    // begin-user-code
    this.meeting = meeting;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
private Set<MeetingDashboard> eMeeting;

/**
 * @return the eMeeting
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public Set<MeetingDashboard> geteMeeting() {
    // begin-user-code
    return eMeeting;
    // end-user-code
}

/**
 * @param eMeeting the eMeeting to set
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public void seteMeeting(Set<MeetingDashboard> eMeeting) {
    // begin-user-code
    this.eMeeting = eMeeting;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
private String userName;

/**
 * @return the userName
 * @generated "UML to Java"
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */

```

```

Employee.java

public String getUserName() {
    // begin-user-code
    return userName;
    // end-user-code
}

/**
 * @param userName the userName to set
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public void setUserName(String userName) {
    // begin-user-code
    this.userName = userName;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
private String password;

/**
 * @return the password
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public String getPassword() {
    // begin-user-code
    return password;
    // end-user-code
}

/**
 * @param password the password to set
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public void setPassword(String password) {
    // begin-user-code
    this.password = password;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
private Set<Meeting> Duplicate_1_eMeeting;

/**
 * @return the Duplicate_1_eMeeting
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"

```

```

Employee.java

*/
public Set<Meeting> getDuplicate_1_eMeeting() {
    // begin-user-code
    return Duplicate_1_eMeeting;
    // end-user-code
}

/**
 * @param Duplicate_1_eMeeting the Duplicate_1_eMeeting to set
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public void setDuplicate_1_eMeeting(Set<Meeting> Duplicate_1_eMeeting) {
    // begin-user-code
    this.Duplicate_1_eMeeting = Duplicate_1_eMeeting;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
private Set<Meeting> Duplicate_1_meeting;

/**
 * @return the Duplicate_1_meeting
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public Set<Meeting> getDuplicate_1_meeting() {
    // begin-user-code
    return Duplicate_1_meeting;
    // end-user-code
}

/**
 * @param Duplicate_1_meeting the Duplicate_1_meeting to set
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public void setDuplicate_1_meeting(Set<Meeting> Duplicate_1_meeting) {
    // begin-user-code
    this.Duplicate_1_meeting = Duplicate_1_meeting;
    // end-user-code
}

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @param uName
 * @param pass
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
protected void login(String uName, String pass) {
    // begin-user-code
    // TODO Auto-generated method stub
}

```

```
Employee.java
```

```
        // end-user-code  
    }  
}
```

```
ArchitectDashboard.java
```

```
/**  
 * import java.util.Set;  
  
/**  
 * <!-- begin-UML-doc -->  
 * <!-- end-UML-doc -->  
 * @author Krushnam  
 * @generated "UML to Java  
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"  
*/  
public class ArchitectDashboard extends Employee {  
    /**  
     * <!-- begin-UML-doc -->  
     * <!-- end-UML-doc -->  
     * @generated "UML to Java  
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"  
     */  
    private Set<BlueprintHandler> eBlueprints;  
  
    /**  
     * @return the eBlueprints  
     * @generated "UML to Java  
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"  
     */  
    public Set<BlueprintHandler> geteBlueprints() {  
        // begin-user-code  
        return eBlueprints;  
        // end-user-code  
    }  
  
    /**  
     * @param eBlueprints the eBlueprints to set  
     * @generated "UML to Java  
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"  
     */  
    public void seteBlueprints(Set<BlueprintHandler> eBlueprints) {  
        // begin-user-code  
        this.eBlueprints = eBlueprints;  
        // end-user-code  
    }  
  
    /**  
     * <!-- begin-UML-doc -->  
     * <!-- end-UML-doc -->  
     * @generated "UML to Java  
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"  
     */  
    private Set<Client> eClients;  
  
    /**  
     * @return the eClients  
     * @generated "UML to Java  
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"  
     */  
    public Set<Client> geteClients() {  
        // begin-user-code  
        return eClients;  
        // end-user-code  
    }
```

```

        ArchitectDashboard.java

    }

    /**
     * @param eClients the eClients to set
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public void seteClients(Set<Client> eClients) {
        // begin-user-code
        this.eClients = eClients;
        // end-user-code
    }

    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @return
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    private BlueprintHandler insertBlueprint() {
        // begin-user-code
        // TODO Auto-generated method stub
        return null;
        // end-user-code
    }

    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @param bp
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    private void editBlueprint(BlueprintHandler bp) {
        // begin-user-code
        // TODO Auto-generated method stub

        // end-user-code
    }

    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @return
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    private Boolean requestApproval() {
        // begin-user-code
        // TODO Auto-generated method stub
        return null;
        // end-user-code
    }
}

```

```

BlueprintHandler.java

/**
 * <!-- begin-UML-doc -->
 * <!-- end-UML-doc -->
 * @author Krushnam
 * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
 */
public class BlueprintHandler {
    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    private Project projects;

    /**
     * @return the projects
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public Project getProjects() {
        // begin-user-code
        return projects;
        // end-user-code
    }

    /**
     * @param projects the projects to set
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public void setProjects(Project projects) {
        // begin-user-code
        this.projects = projects;
        // end-user-code
    }

    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    private Blueprint blueprint;

    /**
     * @return the blueprint
     * @generated "UML to Java
(com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public Blueprint getBlueprint() {
        // begin-user-code
        return blueprint;
        // end-user-code
    }
}

```

```

        BlueprintHandler.java

    /**
     * @param blueprint the blueprint to set
     * @generated "UML to Java"
     (com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    public void setBlueprint(Blueprint blueprint) {
        // begin-user-code
        this.blueprint = blueprint;
        // end-user-code
    }

    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @return
     * @generated "UML to Java"
     (com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    protected String getStatus() {
        // begin-user-code
        // TODO Auto-generated method stub
        return null;
        // end-user-code
    }

    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @param stat
     * @generated "UML to Java"
     (com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    protected void setStatus(String stat) {
        // begin-user-code
        // TODO Auto-generated method stub

        // end-user-code
    }

    /**
     * <!-- begin-UML-doc -->
     * <!-- end-UML-doc -->
     * @param bp
     * @generated "UML to Java"
     (com.ibm.xtools.transform.uml2.java5.internal.UML2JavaTransform)"
     */
    protected void finalizeBlueprint(BlueprintHandler bp) {
        // begin-user-code
        // TODO Auto-generated method stub

        // end-user-code
    }
}

```

Task 4 - System Complexity

a) Layers and Partitions

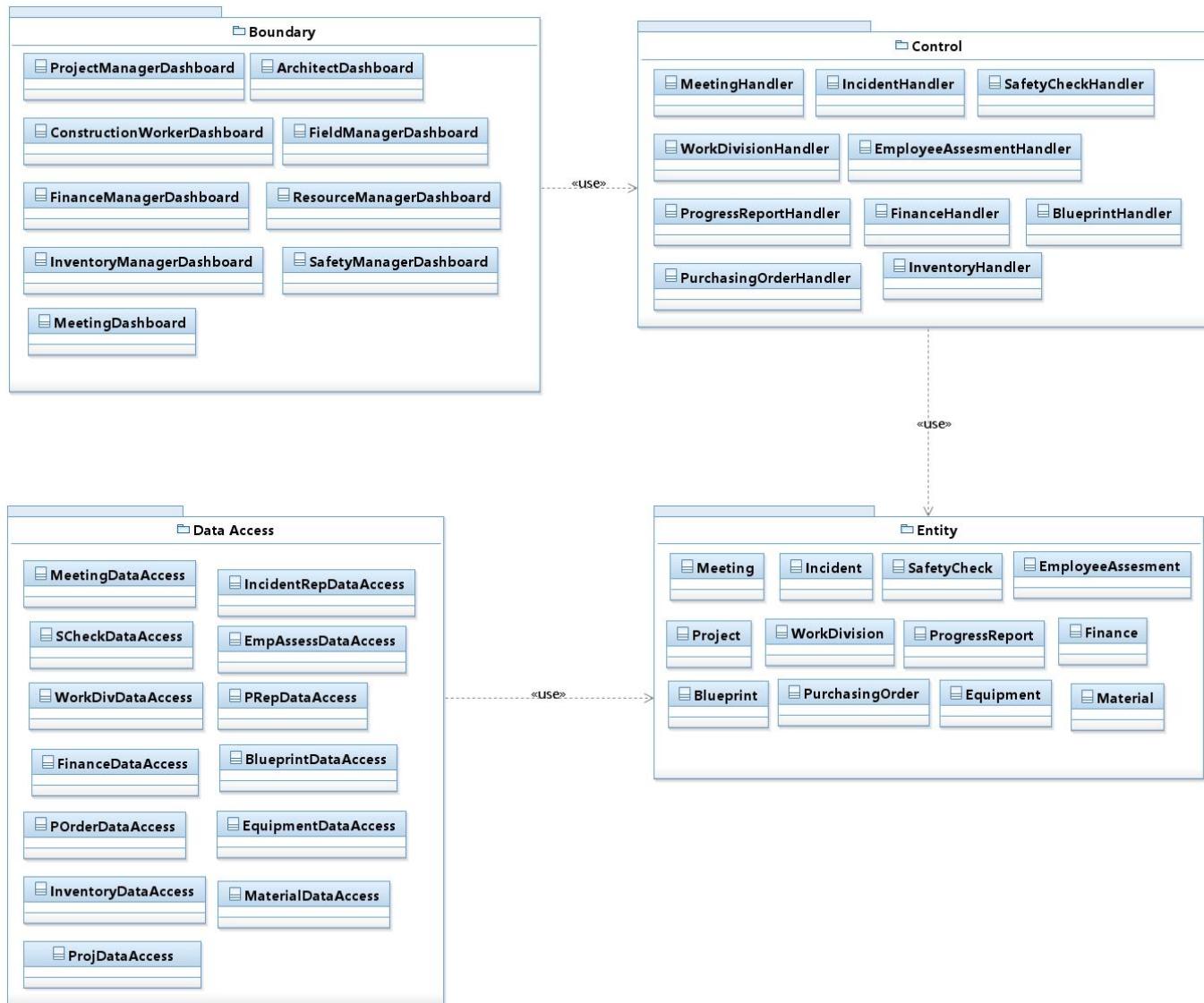
BCED APPROACH

- Boundary Classes
 - These are classes assigned to each actor so that they can view the user interface (dashboard). So for example the project manager can view the CMIS user interface to create a project schedule, while the field manager can view the CMIS user interface to create work order documents, fill in employee assessments and so on.
 - Naming Convention used for all boundary classes ends with the word dashboard that is ProjectManagerDashboard, FieldManagerDashboard and so on.
- Control Classes
 - These are classes that manage the data and program flow in the CMIS. For example the input events and the activities of each 16 use cases the actor is permitted to do (listed in deliverable 2). Further this would mean that the project manager's activity includes work division which can be executed through the work division controller class.
 - Naming Convention used for all control classes ends with the word handler that is WorkDivisionHandler,ProgressReportHandler,FinanceHandler and so on.
- Entity Classes
 - There are multiple entity classes linked to each actor. Each actor is allowed to perform a certain number of tasks with the use of controller class. The values of these tasks (inputs) are stored in the attributes of these entity classes. For example the inventory manager inputs the equipment name,detail, availability, inputs in the tracking equipment use case and these values are stored in the attributes of the equipment entity class.
 - Naming Convention used for all entity classes includes the use of keywords in our information system.

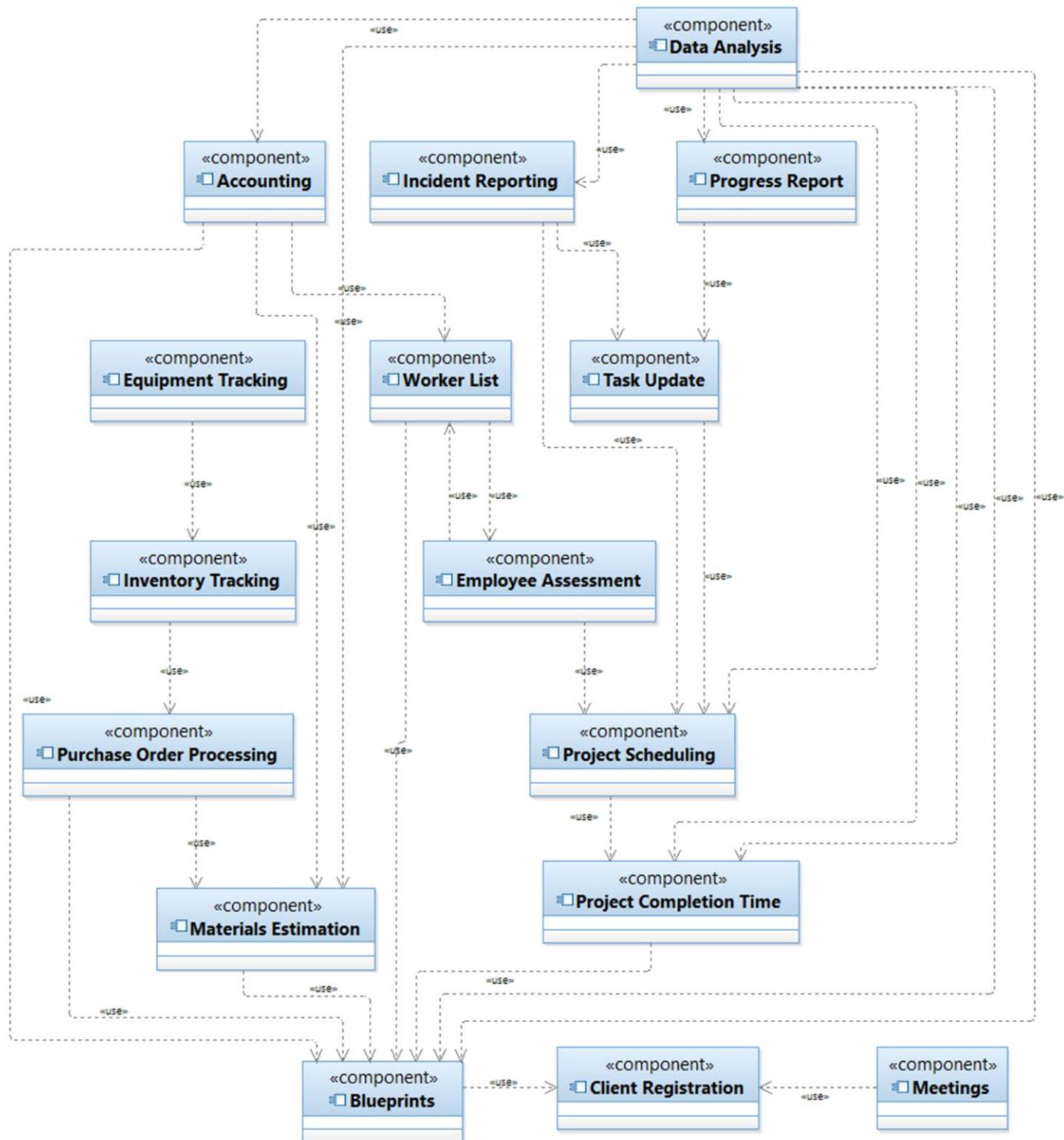
- DataAccess Classes
 - These are classes that store the entity information for the whole CMIS. We have 13 DataAccess classes for the CMIS. For example we have a DataAccess for the project that is called ProjDataAccess, WorkDivDataAccess for WorkDivision entity and so on.
 - Naming Convention used for data access classes ends with the word DataAccess.

The Package Diagram below shows a better overview of the classes included in BCE approach.

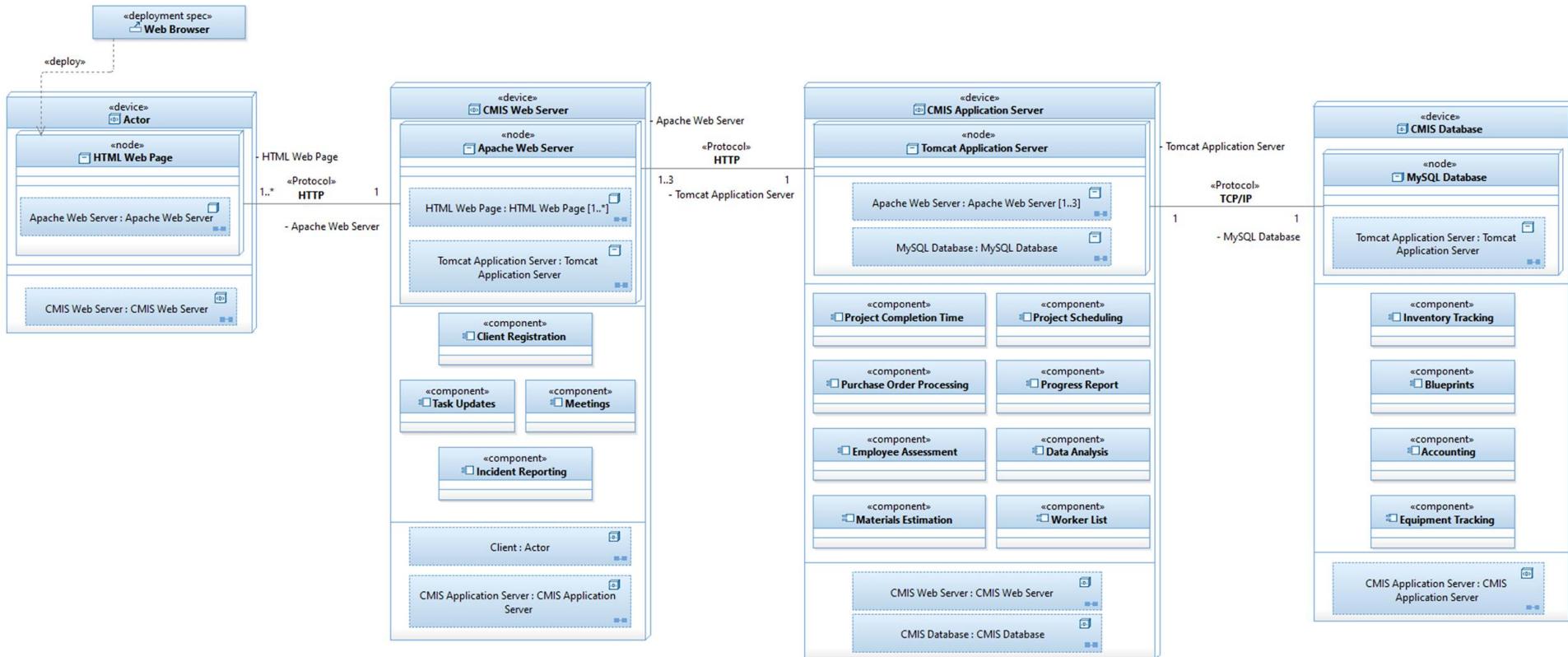
b) Package Diagram



c) Component Diagram



d) Deployment Diagram



Deliverable 4 - Screenshots of the function prototype w/ explanation indicating tools and technologies used

We have used “Justinmind” tool to develop our fully functioning prototype for the Construction Management Information System (CMIS). HTML & CSS were some of the languages used to design the prototype.

Our information system mainly uses a lot of images, buttons, input fields, drop down boxes, other unique tools used would be elaborate below.

Screenshots of our prototype have been attached below for your reference:

The screenshot shows the 'Purchasing Orders' page of the CMIS system. The header features the CMIS logo, a navigation bar with 'Notification' and 'My Account' links, and a sidebar with 'New Order', 'Order Requests', and 'Track Orders' buttons. The main content area displays a table of purchasing orders with columns for Order Name, Order Type, and Status. The data is as follows:

| Order Name | Order Type | Status |
|------------|------------|----------|
| A | Materials | Approved |
| B | Equipment | Approved |
| C | Equipment | Pending |

[Logout](#)

Welcome to Construction Management Information System (CMIS)



Sign In

Email Address

Password

[Login](#)

[Create Account](#)

This is the sign in page for our information system that lets the employees like architect, field manager, finance manager, construction worker, project manager, inventory manager, safety manager, resource manager to login to our system with their respective email ids and passwords.

Welcome to Construction Management Information System (CMIS)



Create Account

Full Name

User Name

Password

Confirm Password

Role

[Sign Up](#)

[Sign In](#)

Our Sign Up page takes in all the relevant information needed to be stored for future reference as well as for the actor to log in the next time he visits our CMIS. [Register Client Component]

The screenshot shows the CMIS Dashboard for 'Project A'. The top navigation bar includes the CMIS logo, a house icon for back, a notification bell icon, and a 'My Account' link. The main title 'Dashboard - Project A' is centered above three columns of cards. The first column, 'Blue Print', contains 'Materials Requirement', 'Completion Time', 'Purchase Order', and 'Inventory Management'. The second column, 'Worker List', contains 'Project Scheduler', 'Progress Report', 'Task update', and 'Employee Assessment'. The third column, 'Budget Management', contains 'Meeting Scheduler', 'Equipment Tracker', 'Analyze Data', and 'Incidence Reporter'. A 'Logout' link is located at the bottom left of the sidebar.

This is our main CMIS Dashboard that has been uniquely divided into three columns that is initialisation, deployment and construction. These three columns have been differentiated with the use of colour. An aesthetic feature added to the dashboard includes the change of colour in the buttons when you hover over it.

The layout of the dashboard includes intricate details like assigning an logo to the CMIS, notifications, my account buttons, any latest updates could be seen in the sidebar, and a logout option has been provided in the left corner. The house icon on the upper left corner is used to come back to the main dashboard.

Blueprint

CMIS

Notification My Account

Blueprints Requirements - Project A

Select Construction Type

Floors 1 ^ v

Bedrooms 1 ^ v

Bathrooms 1 ^ v

[Retrieve Blueprints](#)

[Logout](#)

In this component we have made use of icons instead of text to make our blueprint component stand out. Construction type options include house, hotel, building and so on.

CMIS

Notification My Account

Blueprints Requirements - Project A

External Structure

Internal Structure

[Edit Blueprint](#)

[Logout](#)

A blueprint is pulled out from the database once the details are filled in.

Blueprints Requirements - Project A

Room: Master Bedroom

Edit Blueprint Specification

| | |
|-------------------------|--|
| Height | |
| Width | |
| Length | |
| Desired Cost | |
| Materials | |
| Additional Requirements | |

Edit

An option of editing the blueprint specifications is given to the architect to meet client's requirements

Material Estimation

Materials Estimation

| Materials | Quantity |
|-----------|----------|
| Glass | 300 |
| Wood | 50 |
| Plastic | 75 |

Total Cost: \$20,000 **Request Approval**

Our CMIS automatically calculates the amount of material's quantity needed for the construction according to the blueprint. The logic behind calculation of the quantity includes the information

system using a bit complex code that involves retrieving blueprint requirement data (from the database) and calculating the material needed based on the surface area of the construction.

The screenshot shows the 'Materials Estimation' section of the CMIS application. On the left sidebar, there are links for 'Estimate Materials' and 'View Requests'. At the top right, there are 'Notification' and 'My Account' icons. The main content area displays a table titled 'Materials Estimation' with three rows:

| Request | Status |
|---------|-------------|
| A | Pending |
| B | Approved |
| C | Disapproved |

At the bottom left of the main content area is a 'Logout' link.

This page displays the approval or denial of materials requested according to the overall project budget designated for this assignment.

Purchase Order

The screenshot shows the 'Purchasing Orders' section of the CMIS application. On the left sidebar, there are links for 'New Order', 'Order Requests', and 'Track Orders'. At the top right, there are 'Notification' and 'My Account' icons. The main content area has a shopping cart icon with a '0' next to it. The central part of the screen is a form titled 'Place A New Order' with fields for 'Order Name' (A), 'Order Type' (Materials), 'Material Name' (Driller), and 'Material Quantity' (1). Below the form is a 'Add to Cart' button. At the bottom of the screen is a 'Past Orders' section featuring four items:

- Steel Nails**: \$20, Pack of 100. **Add to Cart**
- Raw Wood**: \$200, 50kg, 300x300x50 inches. **Add to Cart**
- Concrete Blocks**: \$575, 5000 blocks, 100x100x20 inches. **Add to Cart**
- General Hammer**: \$69.99, Single unit. **Add to Cart**

At the bottom left of the main content area is a 'Logout' link.

All the purchase orders for the equipment and the materials is made here , the shopping cart feature was a different idea we used.

The screenshot shows the CMIS application interface. The top navigation bar includes the CMIS logo, a notification icon, and a 'My Account' link. On the left sidebar, there are three buttons: '+ New Order', '= Order Requests', and 'Track Orders'. Below the sidebar is a 'Logout' link. The main content area is titled 'Purchasing Orders' and displays a table of approved orders:

| Order Name | Order Type | Status |
|------------|------------|----------|
| A | Materials | Approved |
| B | Equipment | Approved |
| C | Equipment | Pending |

This page shows the orders that have been approved

The screenshot shows the CMIS application interface. The top navigation bar includes the CMIS logo, a notification icon, and a 'My Account' link. On the left sidebar, there are three buttons: '+ New Order', '= Order Requests', and 'Track Orders'. Below the sidebar is a 'Logout' link. The main content area is titled 'Purchasing Orders' and displays a table of orders. A dropdown menu labeled 'Select Order' is set to 'A'. An estimated delivery date of '04/15/2021' is shown. The table details the items ordered:

| Item Name | Item Quantity | Price |
|-------------|---------------|-------|
| Glass Tiles | 250 | \$750 |
| Driller | 1 | \$115 |

This page was added to review the purchase order history according to the request. For this we did have to use the database to retrieve and display the information.

Project Scheduler

The screenshot shows the 'Project Schedule' page. At the top, there is a navigation bar with the CMIS logo, a notification icon, and a 'My Account' link. Below the navigation bar, the title 'Project Schedule' is displayed in green. There are two blue links: 'Add New Activity' and 'Work Schedule'. A search bar with the placeholder 'Activity Phase' is followed by a 'Search' button and a 'Clear' button. The main content area contains a table with the following data:

| ID | Activity Phase | Name | Duration | Predecessor | Start | Finish | Assignee |
|----|-------------------------|------------------------|----------|-------------|------------|------------|----------|
| 1 | Grading & Building Per. | Schedule lot stake-out | 1 day | - | 03/29/2021 | 03/29/2021 | |
| 2 | Grading & Building Per. | Pay Permit Fees and | 1 day | 1, 2days | 03/30/2021 | 03/30/2021 | |
| 3 | Grading & Building Per. | Building Permit Issuer | 1 day | 2 | 04/01/2021 | 04/02/2021 | |
| 4 | Site Work | Clear Lot | 3 days | 3 | 04/05/2021 | 04/08/2021 | |
| 5 | Site Work | Stake Lot for Excavat | 1 day | 4, 1day | 04/12/2021 | 04/13/2021 | |

6 items found, displaying 1 to 5. [First](#) [Prev](#) [1](#) [2](#) [Next](#) [Last](#)

The field manager can be added here , an new record can be added and deleted as well

The screenshot shows the 'Add New Activity' form. At the top, there is a navigation bar with the CMIS logo, a notification icon, and a 'My Account' link. Below the navigation bar, the title 'Add New Activity' is displayed in green. There are two blue links: 'Add New Activity' and 'Work Schedule'. The form itself has fields for ID, Activity Phase, Name, Duration, Predecessor, Start, Finish, and Assignee, each with a corresponding input field. At the bottom of the form are 'Submit' and 'Cancel' buttons.

When you click + it leads you to this page

The screenshot shows the CMIS Work Schedule page. At the top, there is a navigation bar with the CMIS logo, a notification icon, and a My Account icon. Below the navigation bar, the title "Work Schedule" is displayed next to a house icon. On the left side, there are three links: "Add New Activity", "Work Schedule", and "Modify Wokr Order". The main content area contains two search boxes: one for "Activity Phase" and one for "Assignee", each with a "Search" button. Below these search boxes is a table listing five work items. The table has columns for ID, Activity Phase, Name, Duration, Predecessors, Start, Finish, and Assignee. Each row in the table includes a small edit icon. At the bottom of the table, it says "6 items found, displaying 1 to 5." and provides navigation links for First, Prev, Next, and Last.

| ID | Activity Phase | Name | Duration | Predecessors | Start | Finish | Assignee |
|----|---------------------|-----------------------|----------|--------------|-------------|----------------|----------|
| 1 | Grading & Buildi... | Schedule lot stak... | 1 day | - | 03/29/2021 | 03/29/2021 6:0 | |
| 2 | Grading & Buildi... | Pay Permit Fees ... | 1 day | 1, 2days | 03/30/2021 | 03/30/2021 5:0 | |
| 3 | Grading & Buildi... | Building Permit Is... | 1 day | 2 | 04/01/2021 | 04/02/2021 5:3 | |
| 4 | Site Work | Clear Lot | 3 days | 3 | 04/05/ 2021 | 04/08/2021 7:0 | |
| 5 | Site Work | Stake Lot for Exc... | 1 day | 4, 1day | 04/12/2021 | 04/13/2021 5:3 | |



Work Schedule

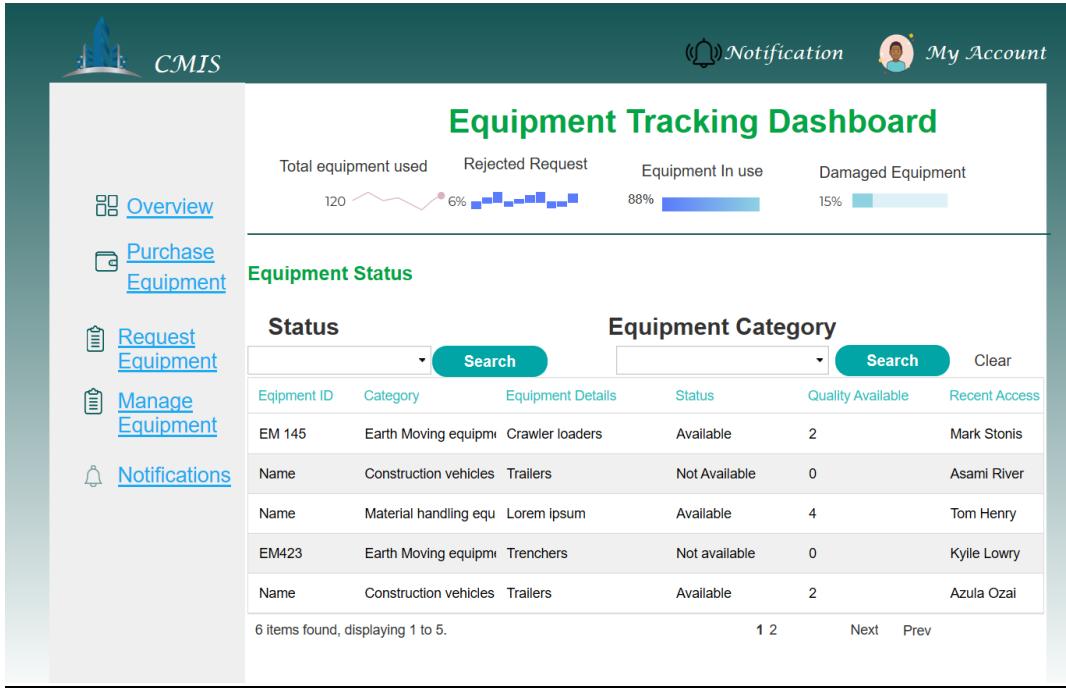
[Add New Activity](#)[Work Schedule](#)

| | |
|----------------|----------------------------|
| ID | 1 |
| Activity Phase | Grading & Building Permits |
| Name | Schedule lot stake-out |
| Duration | 1 day |
| Predecessors | - |
| Start | 03/29/2021 8:30 AM |
| Finish | 03/29/2021 6:00 PM |
| Assignee | |

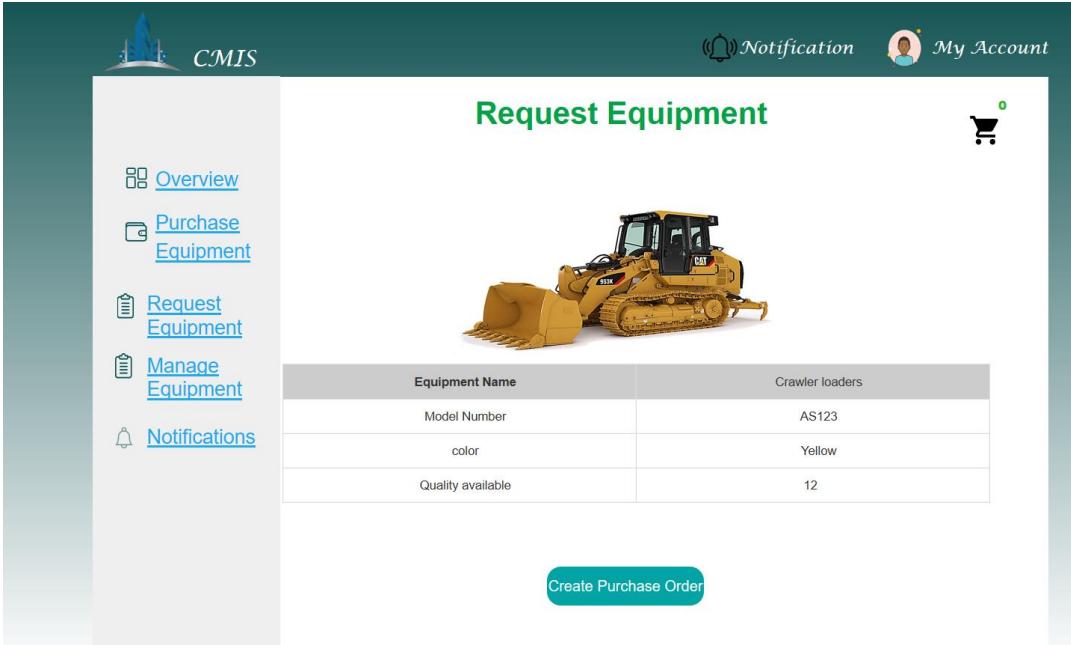
[Modify](#) [Cancel](#)

Work Order Schedule is on the same basis like project scheduler

Equipment Tracking²

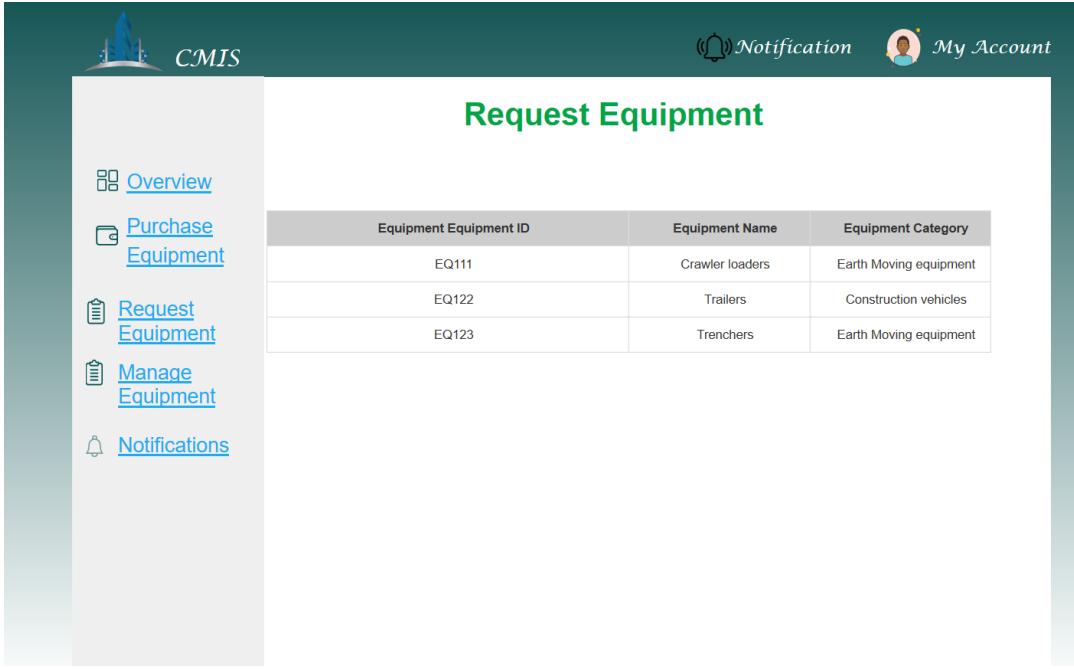


The dashboard features a header with the CMIS logo, a notification bell icon, and a user account icon. Below the header is a title card reading "Equipment Tracking Dashboard". The dashboard includes four status indicators with progress bars: "Total equipment used" (120, 6%), "Rejected Request" (88%), "Equipment In use" (88%), and "Damaged Equipment" (15%). A section titled "Equipment Status" contains two search filters: "Status" and "Equipment Category". A table lists equipment details such as ID, category, name, and status. At the bottom, a message indicates 6 items found, displaying 1 to 5, with navigation links for page 1, 2, Next, and Prev.



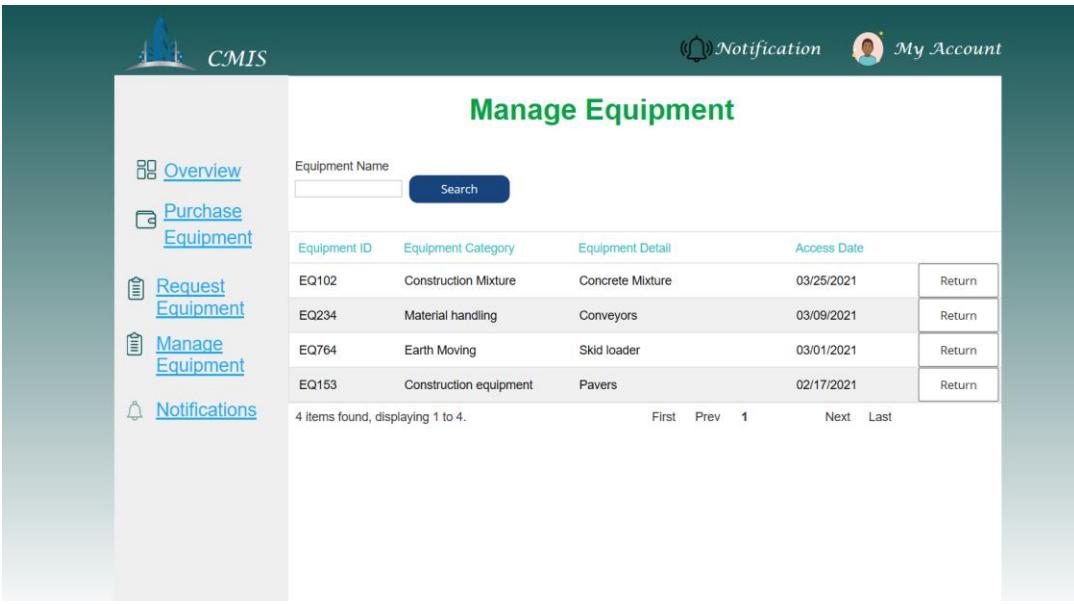
The page has a header with the CMIS logo, a notification bell icon, and a user account icon. The main title is "Request Equipment". On the right, there is a shopping cart icon with a small number '0' above it. The left sidebar contains navigation links: Overview, Purchase Equipment, Request Equipment (which is currently selected), Manage Equipment, and Notifications. The central area shows a large image of a yellow Caterpillar crawler loader. Below the image is a table with equipment details. At the bottom is a teal button labeled "Create Purchase Order".

² We haven't explained the prototype from here since the report would be very lengthy, however all these components were explained in detail during the presentation



The screenshot shows the CMIS system interface for requesting equipment. The top navigation bar includes the CMIS logo, a notification icon, and a user account icon. The main title "Request Equipment" is displayed prominently. On the left sidebar, there are five menu items: Overview, Purchase Equipment, Request Equipment (which is selected and highlighted in blue), Manage Equipment, and Notifications. The central content area displays a table of equipment records:

| Equipment ID | Equipment Name | Equipment Category |
|--------------|-----------------|------------------------|
| EQ111 | Crawler loaders | Earth Moving equipment |
| EQ122 | Trailers | Construction vehicles |
| EQ123 | Trenchers | Earth Moving equipment |



The screenshot shows the CMIS system interface for managing equipment. The top navigation bar includes the CMIS logo, a notification icon, and a user account icon. The main title "Manage Equipment" is displayed prominently. On the left sidebar, there are five menu items: Overview, Purchase Equipment, Request Equipment, Manage Equipment (which is selected and highlighted in blue), and Notifications. The central content area displays a search interface with a "Equipment Name" input field and a "Search" button. Below the search area is a table of equipment records:

| Equipment ID | Equipment Category | Equipment Detail | Access Date | Action |
|--------------|------------------------|------------------|-------------|--------|
| EQ102 | Construction Mixture | Concrete Mixture | 03/25/2021 | Return |
| EQ234 | Material handling | Conveyors | 03/09/2021 | Return |
| EQ764 | Earth Moving | Skid loader | 03/01/2021 | Return |
| EQ153 | Construction equipment | Pavers | 02/17/2021 | Return |

Below the table, a message indicates "4 items found, displaying 1 to 4." and provides navigation links: First, Prev, 1, Next, Last.

Incident Reporting

 CMIS

Safety Report

Create New Report

My reports (3)

| Report Number | Status | Date of Report | Date of occurrence | Incidence Location | Issued By | Affected Employee |
|---------------|--------|----------------|--------------------|--------------------|----------------|-------------------|
| PROJA1445 | Open | 03/16/2021 | 03/11/2021 | Toronto | Fred Vanfleet | Kyle Lowry |
| PROJA4564 | Open | 03/24/2021 | 03/19/2021 | Noth York | Robust Charion | Jason Tatum |
| PROJA3213 | closed | 03/16/2021 | 03/09/2021 | Hamilton | Kyire Irving | Goku Sayan |

3 items found, displaying 1 to 3.

First  Prev  1  Next  Last   

 CMIS

View Report

Create New Report

My reports (3)

| | |
|--------------------|------------------------------|
| Report Number | PROJA1445 |
| Status | Open |
| Date of Report | 03/16/2021 |
| Date of occurrence | 03/11/2021 |
| Incidence Location | Toronto |
| Issued By | Fred Vanfleet |
| Affected Employee | Kyle Lowry |
| Description | Property Damaged |
| Action Taken | Under investigation |
| Comments | Property was damaged heavily |

 CMIS

 [Notification](#)

 [My Account](#)

Create New Report

| | |
|--------------------|----------------------|
| Report Number | <input type="text"/> |
| Status | <input type="text"/> |
| Date of Report | <input type="text"/> |
| Date of occurrence | <input type="text"/> |
| Incidence Location | <input type="text"/> |
| Issued By | <input type="text"/> |
| Affected Employee | <input type="text"/> |
| Description | <input type="text"/> |
| Action Taken | <input type="text"/> |
| Comments | <input type="text"/> |

[Submit](#) [Cancel](#)

 CMIS

 [Notification](#)

 [My Account](#)

My report

| Report ID | Status | Location | Affected Employee | Description | Comments | Date of Occurrence, Report Date |
|-----------|--------|----------|-------------------|-------------------|---------------------------------------|---------------------------------|
| PROJA1445 | Open | Toronto | Kyle Lowry | Property Damaged | Property was damaged heavily | 03/11/2021 |
| PROJA4564 | Open | New York | Jason Tatum | Equipment Failure | Equipment was giving trouble a lon... | 03/19/2021 |
| PROJA3213 | closed | Hamilton | Goku Sayan | Theft | The doors were locked | 03/09/2021 |

Manage Budget

The screenshot shows the 'Manage Budget' section for 'Project A'. At the top, there's a navigation bar with the CMIS logo, a bell icon for 'Notification', and a user profile icon for 'My Account'. Below the navigation bar, the title 'Manage Budget - Project A' is displayed. On the left, there's a sidebar with a house icon and links for 'Manage Budget', 'Material Cost Details', 'Equipment Cost Details', and 'Other Cost Details'. The main content area has a light blue background and displays five categories: Labour, Materials, Equipment, Other, and Total Budget. Each category has an icon (people, wrenches, wrench and spanner, question mark, and a briefcase with a dollar sign), a numerical value (160500, 800, 1150, 150, and 162600), a 'View Details' button, and a status indicator ('Within Budget').

The screenshot shows the 'Labour Cost Breakdown' section. At the top, there's a navigation bar with the CMIS logo, a bell icon for 'Notification', and a user profile icon for 'My Account'. Below the navigation bar, the title 'Labour Cost Breakdown' is displayed. On the left, there's a sidebar with a house icon and links for 'Manage Budget', 'Material Cost Details', 'Equipment Cost Details', and 'Other Cost Details'. The main content area has a light blue background and displays a table with four columns: Name, Position, and Wage. The table contains four rows of data:

| Name | Position | Wage |
|--------------|---------------------|-------|
| Earl Johnson | Project Manager | 45000 |
| Lisa Smith | Construction Worker | 38500 |
| Sam Carl | Construction Worker | 38500 |
| George Tom | Construction Worker | 38500 |

 CMIS

 [Notification](#)

 [My Account](#)



[Manage Budget](#)

[Labour Cost Details](#)

[Equipment Cost Details](#)

[Other Cost Details](#)

Material Cost Breakdown



| Name | Quantity | Cost |
|--------|----------|------|
| Paint | 4 | 100 |
| Wood | 30 | 600 |
| Nails | 500 | 50 |
| Screws | 500 | 50 |

 CMIS

 [Notification](#)

 [My Account](#)



[Manage Budget](#)

[Labour Cost Details](#)

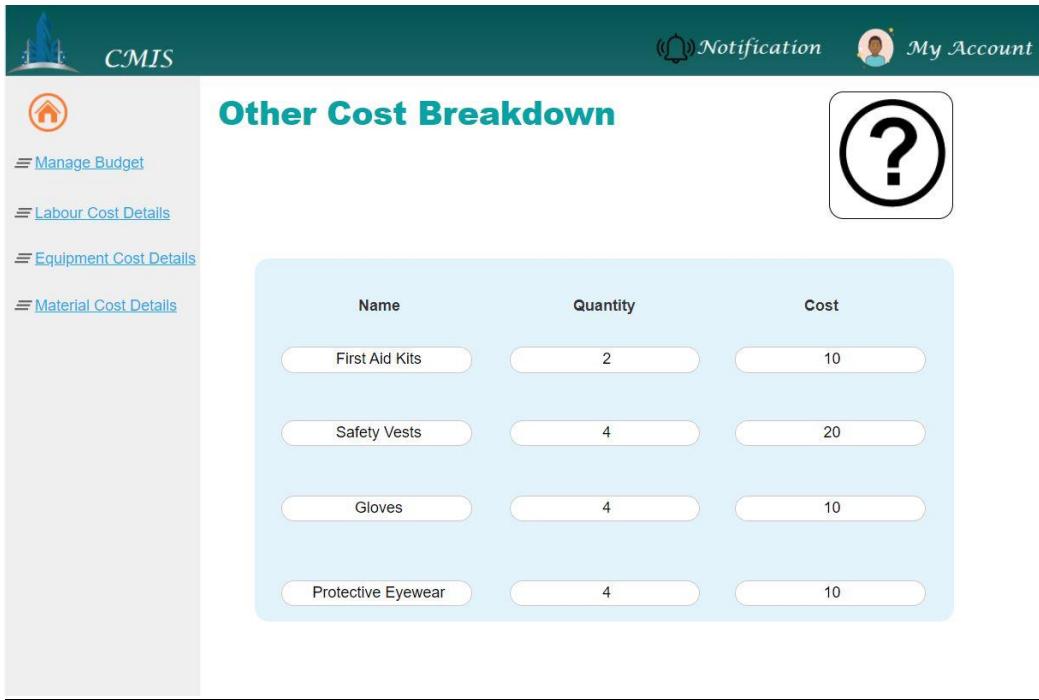
[Material Cost Details](#)

[Other Cost Details](#)

Equipment Cost Breakdown



| Name | Quantity | Cost |
|----------|----------|------|
| Ladders | 4 | 100 |
| Forklift | 1 | 1000 |
| Shovels | 4 | 50 |

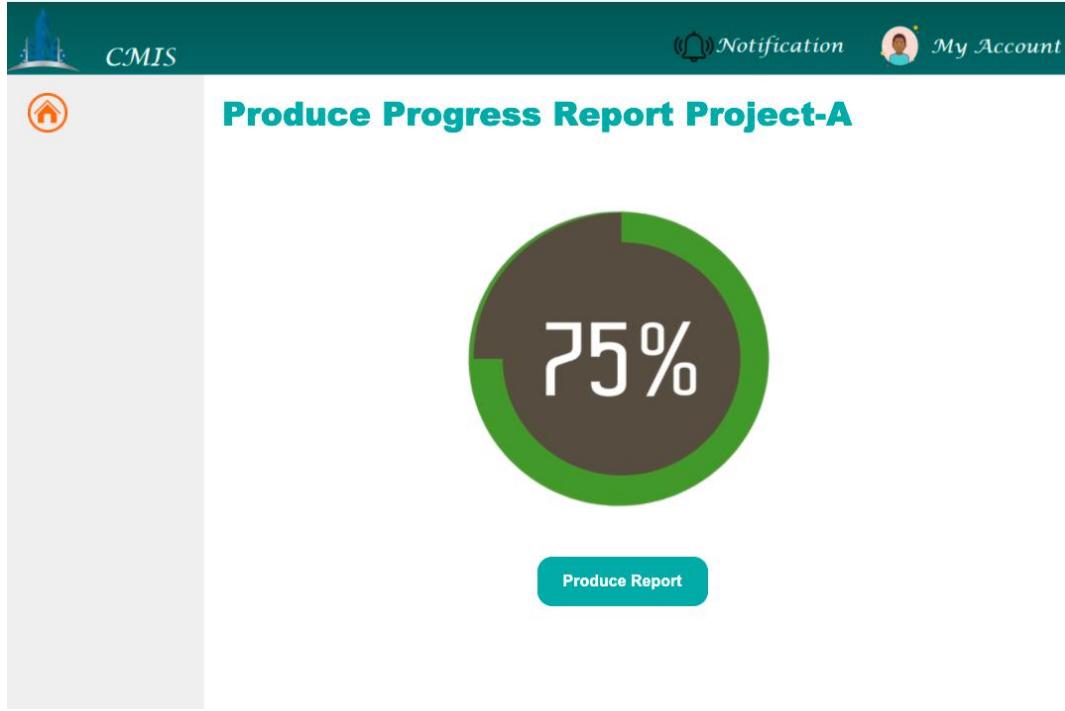
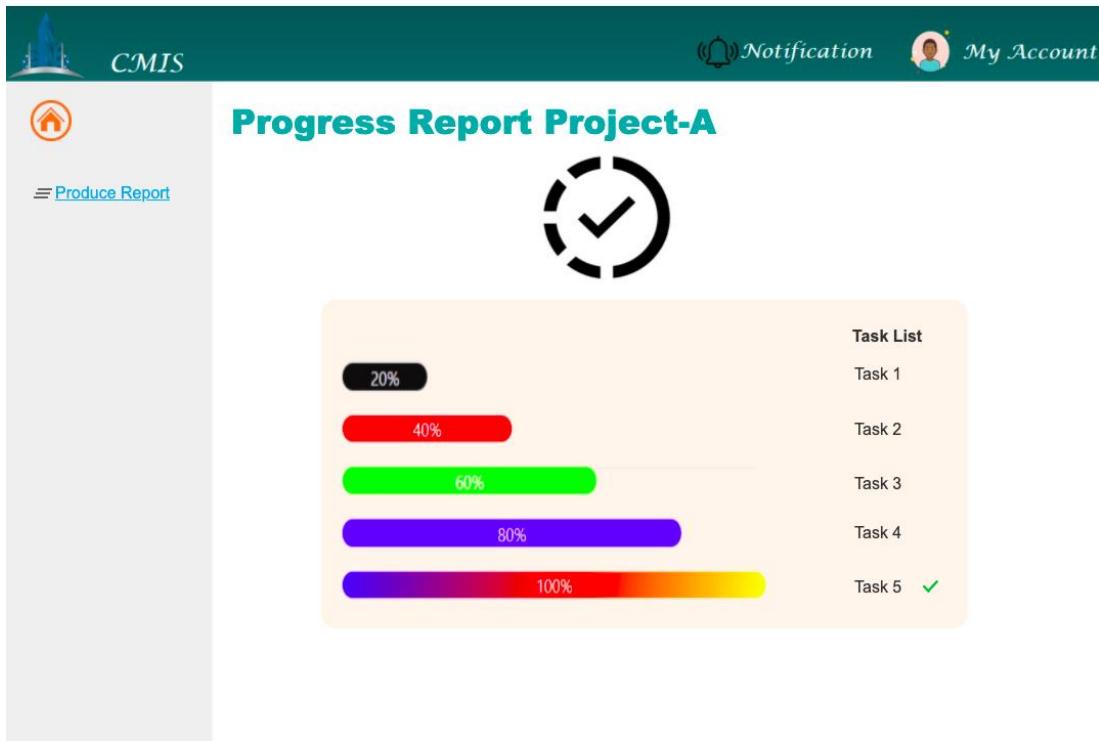


The screenshot shows a software interface titled "Other Cost Breakdown". The top navigation bar includes a logo, the text "CMIS", and links for "Notification" and "My Account". On the left, there's a sidebar with icons and links for "Manage Budget", "Labour Cost Details", "Equipment Cost Details", and "Material Cost Details". The main content area displays a table with four rows of data:

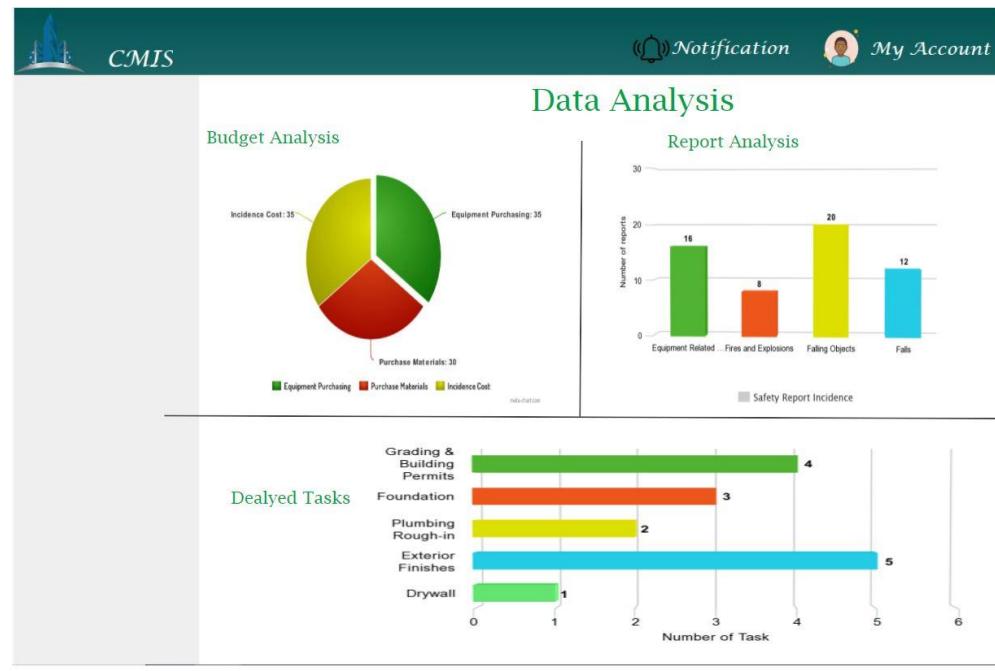
| Name | Quantity | Cost |
|--------------------|----------|------|
| First Aid Kits | 2 | 10 |
| Safety Vests | 4 | 20 |
| Gloves | 4 | 10 |
| Protective Eyewear | 4 | 10 |

A large question mark icon is located in the top right corner of the main content area.

Progress Report



Data Analysis



Participation Marks

- 1. Artur Komissarov- 10**
- 2. Faith-Valentine Uzoka - 10**
- 3. Khaliq Minsariya - 10**
- 4. Krushnam Badami - 10**
- 5. Kyle Rumde - 10**
- 6. Srinath Bhaskaran - 8**
- 7. Varnika Srivastava - 10**