ECSE 321 - Intro to Software Engineering
Design Specification Document - Deliverable 2

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Part I

Architecture of the Proposed Solution

0.1 Description

The software architecture comprises of two different patterns: a Model/View/Controller pattern and a Layered Architecture pattern. An "Authentication and Authorization" layer is on top of the MVC layer. Once the user is authenticated and authorized, they have access to the MVC layer. The MVC system contains three components which interact with each other:

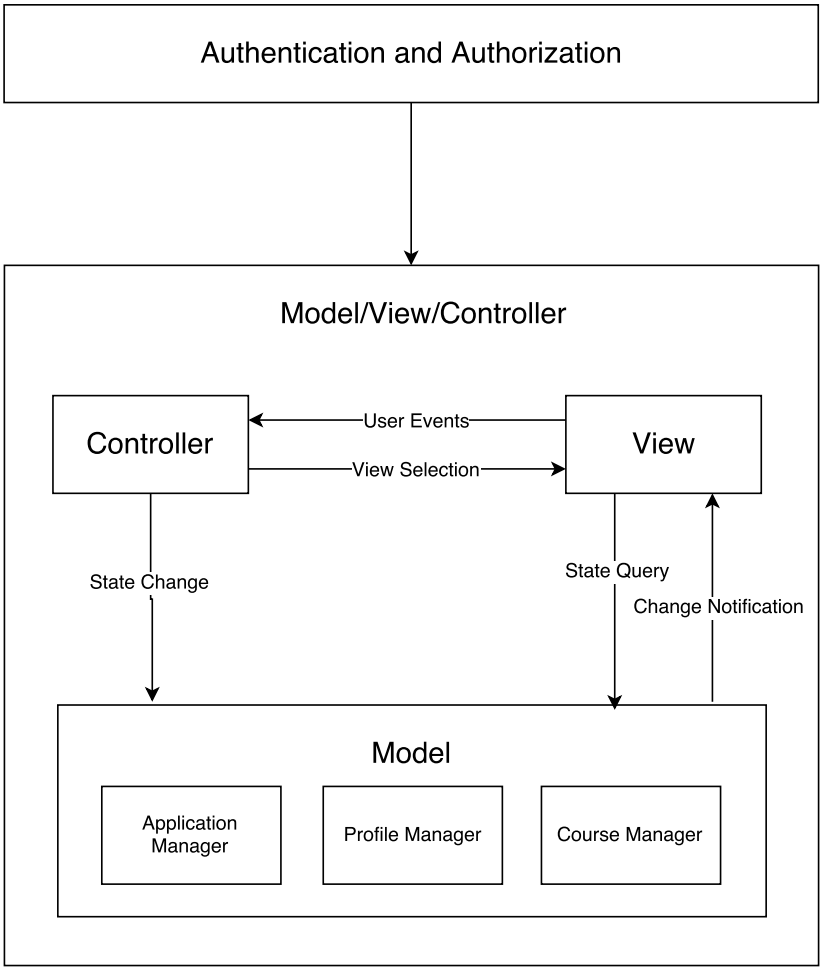
- Controller
- View
- Model

The Model component manages the system data and associated operations on that data; it encapsulates all the entities that are part of the model (can be seen in the model class diagram). The View component defines and manages how the data is presented to the user. The Controller component manages user interaction (key presses, mouse clicks, etc.) and passes these interactions to the View and the Model.

0.2 Rationale

The MVC pattern was chosen because this allows the components to be changed independently. For example, adding a new view or changing an existing view can be done without any changes to the underlying data in the model. It allows the data to change independently of its representation and vice versa. Moreover, it supports presentation of the same data in different ways with changes made in one representation shown in all of them.
Furthermore, the Model-View-Controller pattern makes multiplatform development very convenient. Using this paradigm, equivalent code may be generated for the model component on all platforms, as the model is isolated from the other components. Then, the views are isolated from the controllers so that modifications to the view classes do not affect code for other platforms that utilize the controller classes.
The Layered Architecture pattern was used because the user would need to first authenticate him/herself and then receive authorization in order to interact with the sublayer.

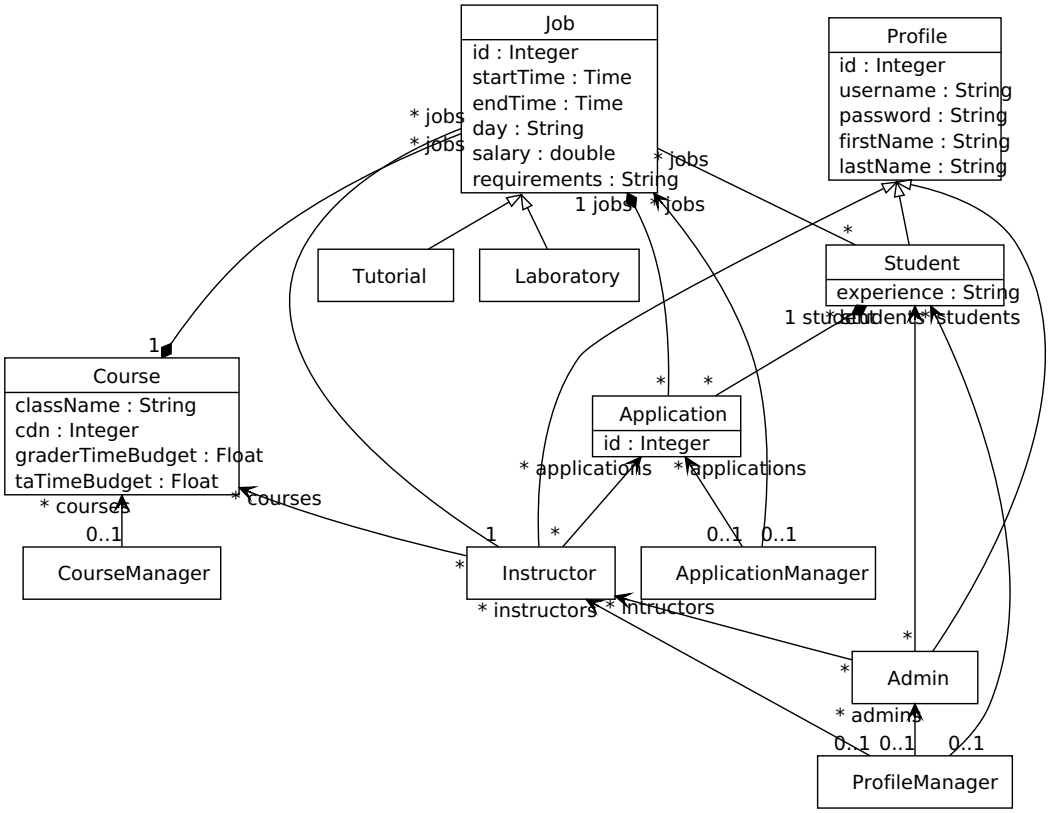
0.3 Block Diagram


Authentication and Authorization
Model/View/Controller
Controller
User Events
View Selection
View
State Change
State Query
Change Notification
Model
Application Manager
Profile Manager
Course Manager

Part II

Description of the Detailed Design

The Domain Model changed significantly since the last Deliverable, and the new domain model may be found below.



0.4 Description

0.4.1 Detailed Domain Model

The Detail Design Diagram consists of the following entities: ApplicationManager, ProfileManager, CourseManager, Application, Profile, Course, Job, Instructor, Admin, Student, Laboratory, and Tutorial. It consists of a Controller, called Controller, a Boundary, called View, and a Persistence, called Persistence XStream. The Controller uses the entities ApplicationManager, ProfileManager, and CourseManager to save, edit, and modify data within the model, which are then saved within a persistence layer. The functionalities of the three "Manager" classes are listed below.

- The ApplicationManager is in charge of Applications, which represent the job application created and submitted by the student for a job. Furthermore, the ApplicationManager is also in charge of managing Job data. It is associated with Application, Job, and ProfileManager.
- ProfileManager creates and manages Admin, Instructor, and Student entities, all of which inherit from the Profile class.
- CourseManager creates and manages Course entities.

0.4.2 Controller Classes

In total there will be three controller classes in the Controller Packages with an additional class for input exceptions or input validation. Each controller class has an associated Manager class, and is in charge of utilizing the manager class safely so that appropriate data is guaranteed to be entered into the persistence layer.
The Controller classes serve the purpose of isolating the model from the input, keeping in mind the philosophies of the Model-View-Controller paradigm.

0.4.3 View Classes

Finally, there are multiple View classes, dependent on the application platform, that act as boundary classes. These classes are in charge of gathering user input in a user-friendly manner. The Web and Mobile applications have four and two Views, respectively, and the Desktop application has five Views.
The View classes are listed by platform below:

Current Desktop Views

1. `MenuView`: Allows user to select which functionality to perform
2. `RegisterView`: Allows user to enter profile information to create a `Student`, `Instructor`, or `Administrator`
3. `CreateCourseView`: Allows user to enter data to create a `Course` given a specific `Instructor`
4. `PublishJobView`: Allows user to enter information required for creating a `Job`
5. `ApplicationView`: Allows user to create an `Application`

Current Mobile Views

1. `MainActivity`: Allows user to select which functionality to perform (analogous to `MenuView`)
2. `ApplyToJob`: Allows user to create an `Application` (analogous to `ApplicationView`)

Current Web Views

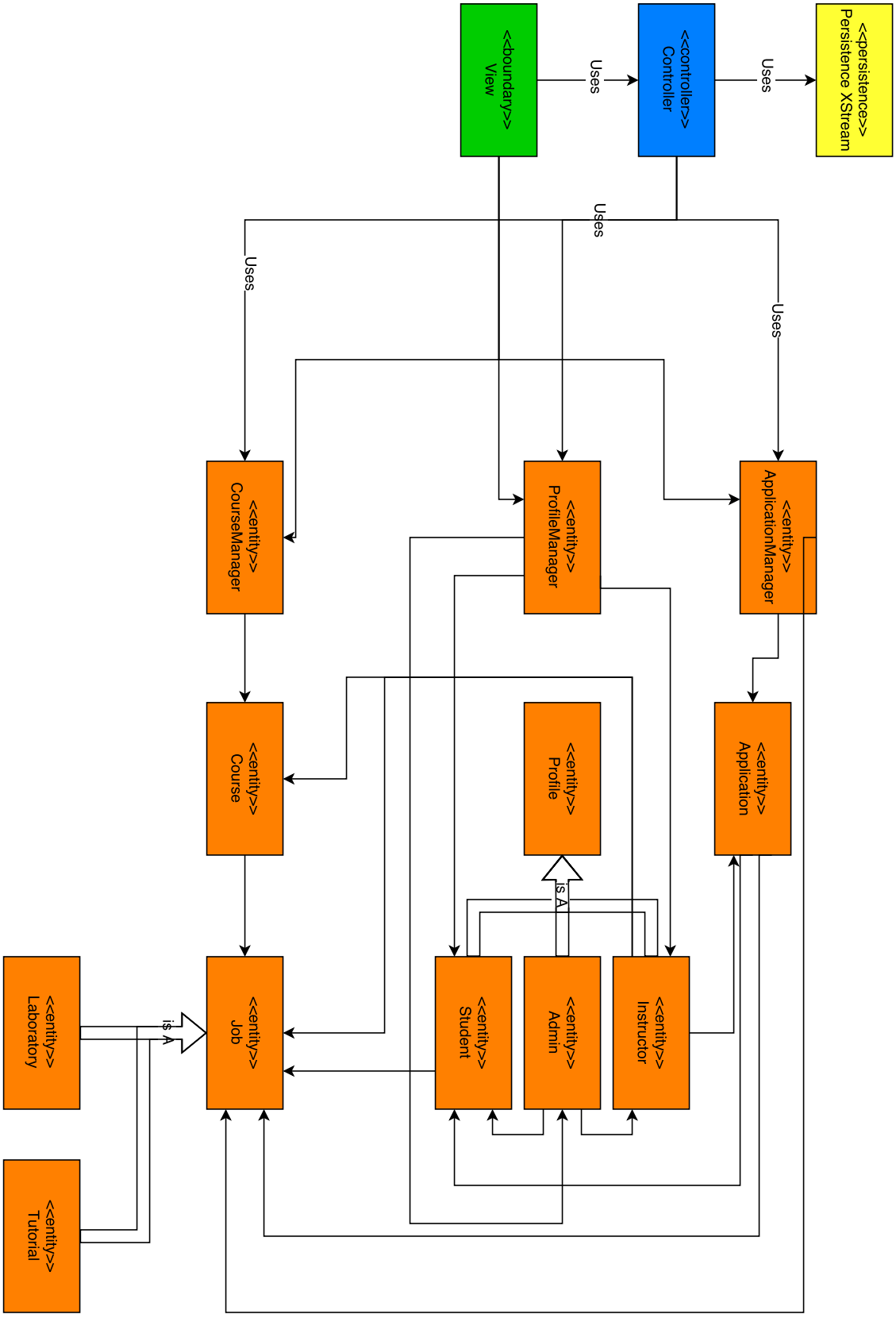
1. `index`: Allows user to select which functionality to perform (analogous to `MenuView`)
2. `createCourse`: Allows user to enter data to create a `Course` (analogous to `CreateCourseView`)
3. `createInstructor`: Allows user to enter data to create an `Instructor` (analogous to `RegisterView`). This View is temporary and will only be used for this Deliverable, as it does not satisfy the requirements of the project.
4. `job`: Allows user to submit data to publish a `Job` (analogous to `PublishJobView`)

0.5 Rationale

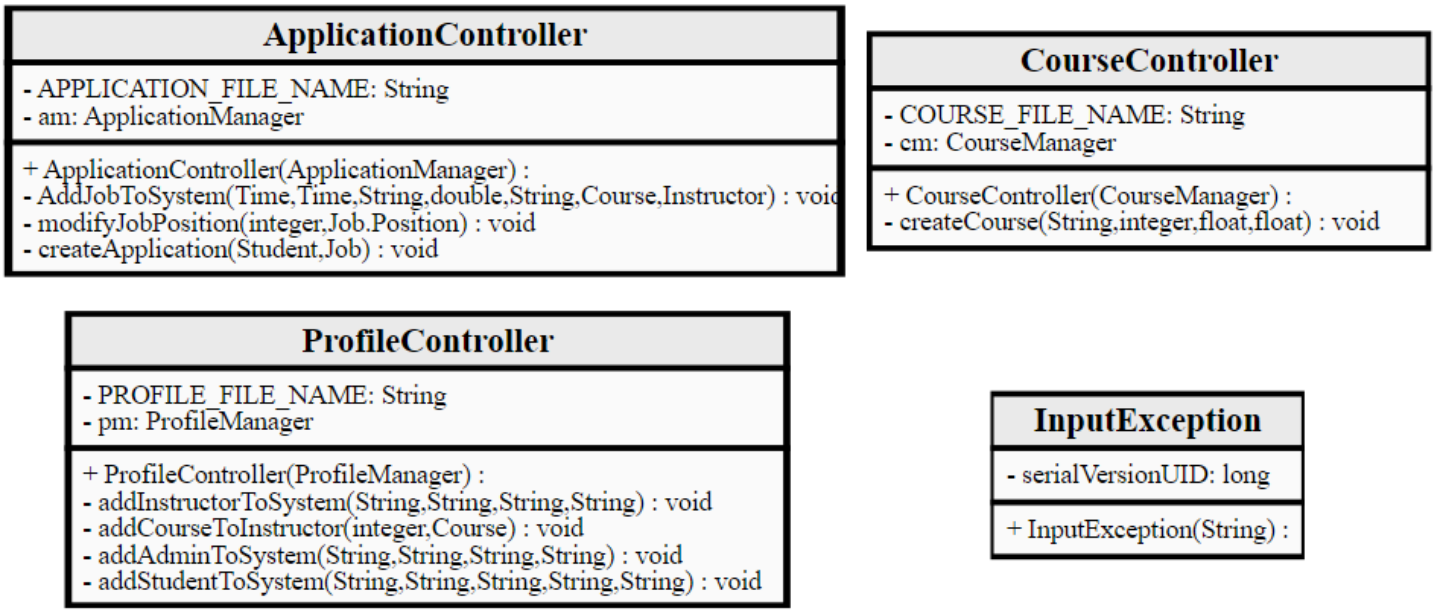
The program was designed this way so as to follow the principles of the Model-View-Controller design pattern. As discussed previously, this allowed for the effective isolation of the user input and the domain model. The Controller classes, along with the `PersistenceXStream` class, allow for persistence to be carried out in a safe manner. The Controller classes are designed in such a way that by using them to create their associated objects, the created objects will automatically be stored within the persistence layer assuming they were created successfully. To avoid storing faulty objects, the `InputException`, as well as several validation classes in PHP, were created. As such, the Controller classes throw exceptions when unworthy data is passed. The ultimate benefit to using this design is that the persistence is taken care of at the level of the controller classes, so the programmer needn't worry about it when designing the Views. With this foundation, the model may be altered reliably.

By perusing the list of Views, it is clear that the mobile and web Views are very similar to the desktop Views in terms of their purposes. This was done to create consistent interfaces across the platforms. The desktop has many views because it is meant to be used by Administrators, who can implement the functionalities possible on all other platforms.

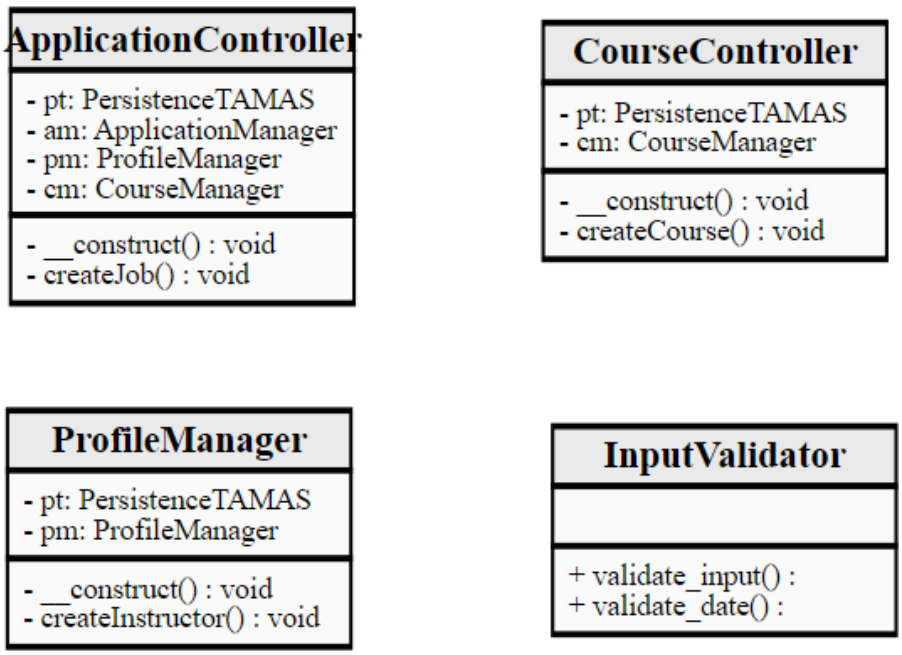
0.6 Detailed Design Diagram



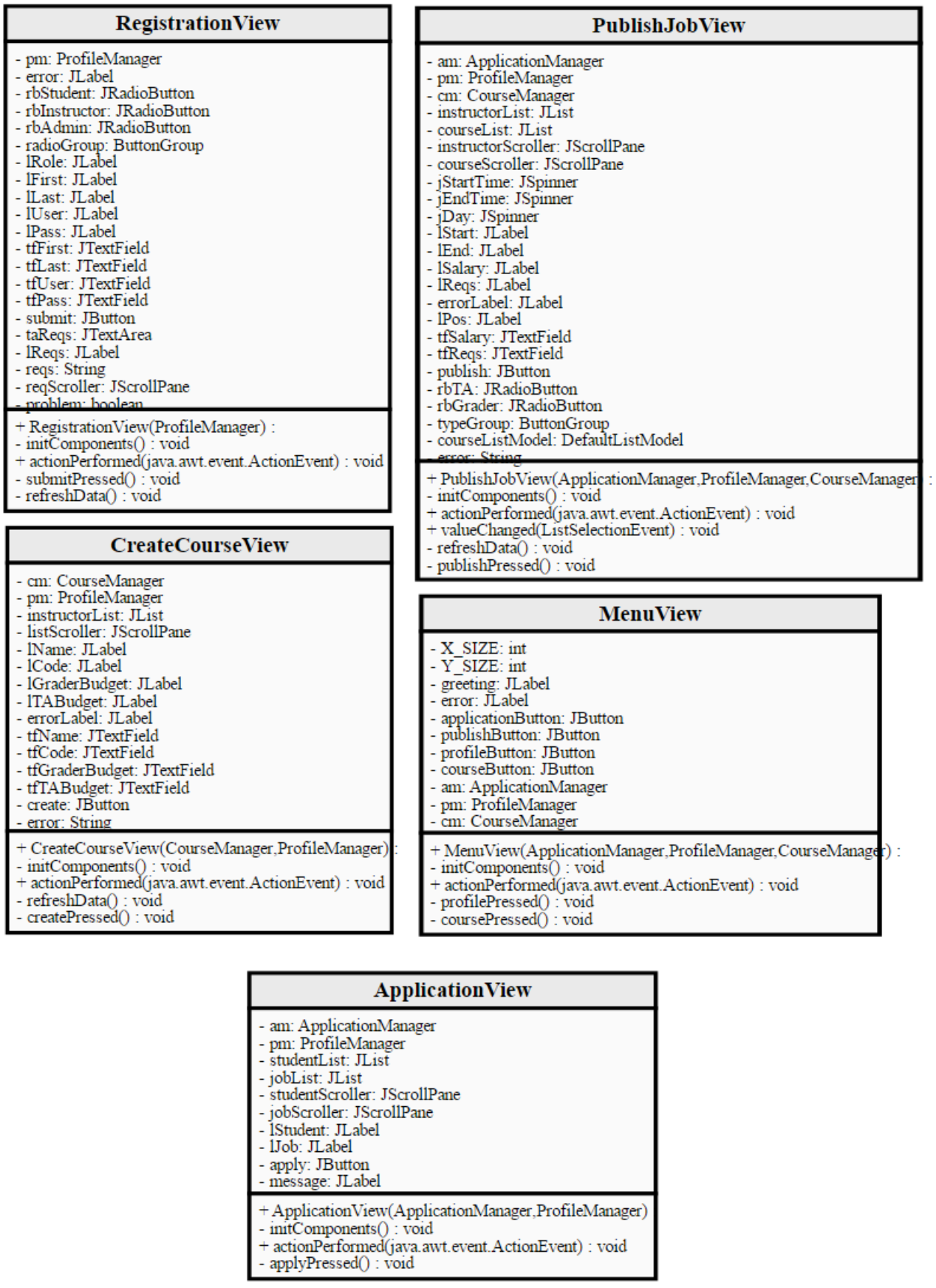
0.7 Java and Android Controller Class Diagram (Desktop and Mobile)



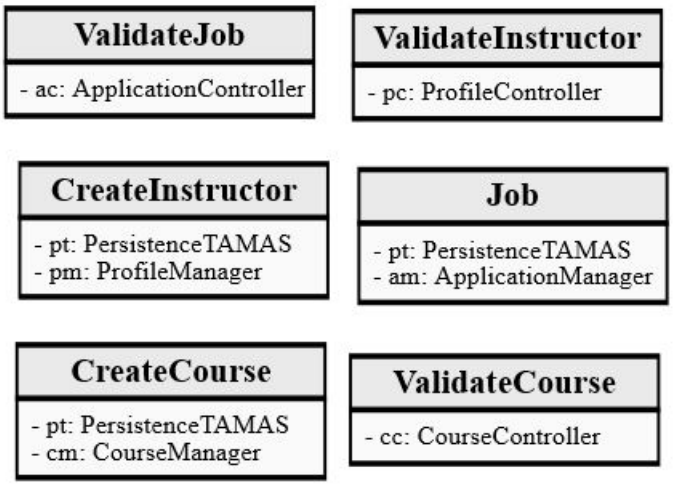
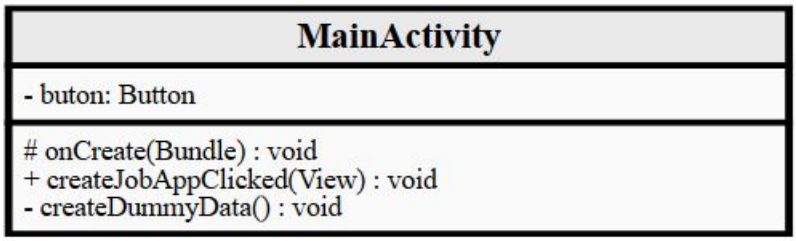
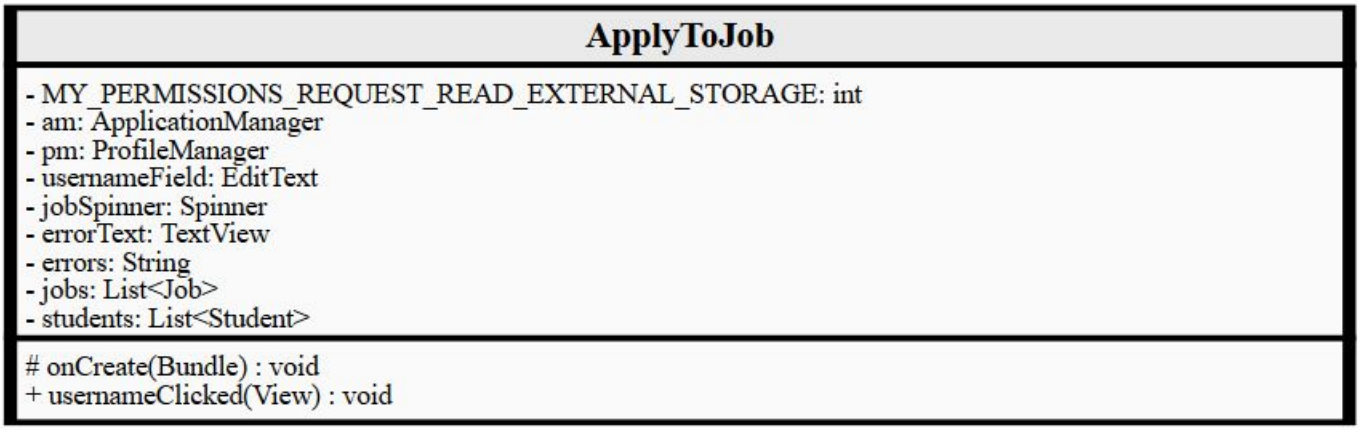
0.8 PHP Controller Class Diagram (Web)



0.9 Java View Class Diagram (Desktop)



0.10 PHP View Class Diagram (Web)



0.11 Android View Class Diagram (Android)