IT314: Software Engineering Lab 4

Group - 10
Project id - 82
Project name: Attendance Management System
Lab Session IV - Specifying Tools and Technology

Tools, Technologies and Frameworks

1. **VS Code:** Editor to help us to connect to github and maintain the project files.
2. **GitHub:** We will use it to collaborate among the team of developers and simplify the management of projects. It helps keep track of the development of progress and store it on cloud for others to pull.
3. **ReactJS:** In frontend, we will use ReactJS which is compatible with all browsers.
4. **MongoDB:** In the backend, we will use MongoDB. It is a strong method of storing and retrieving data.
5. **Bootstrap:** Since bootstrap contains basic boilerplate code, it becomes easier to code quickly and save time. It helps us to make our website responsive.
6. **Pycharm:** Very interactive IDE for python coding

Frontend:

ReactJS:

- It provides us with a single page application and so we can also run it on our local server without loading.
- ReactJS is a free and open-source frontend JavaScript library for building user interfaces based on components.
- React is also compatible with all types of browsers, which makes it easier to develop.

Backend:

Django:

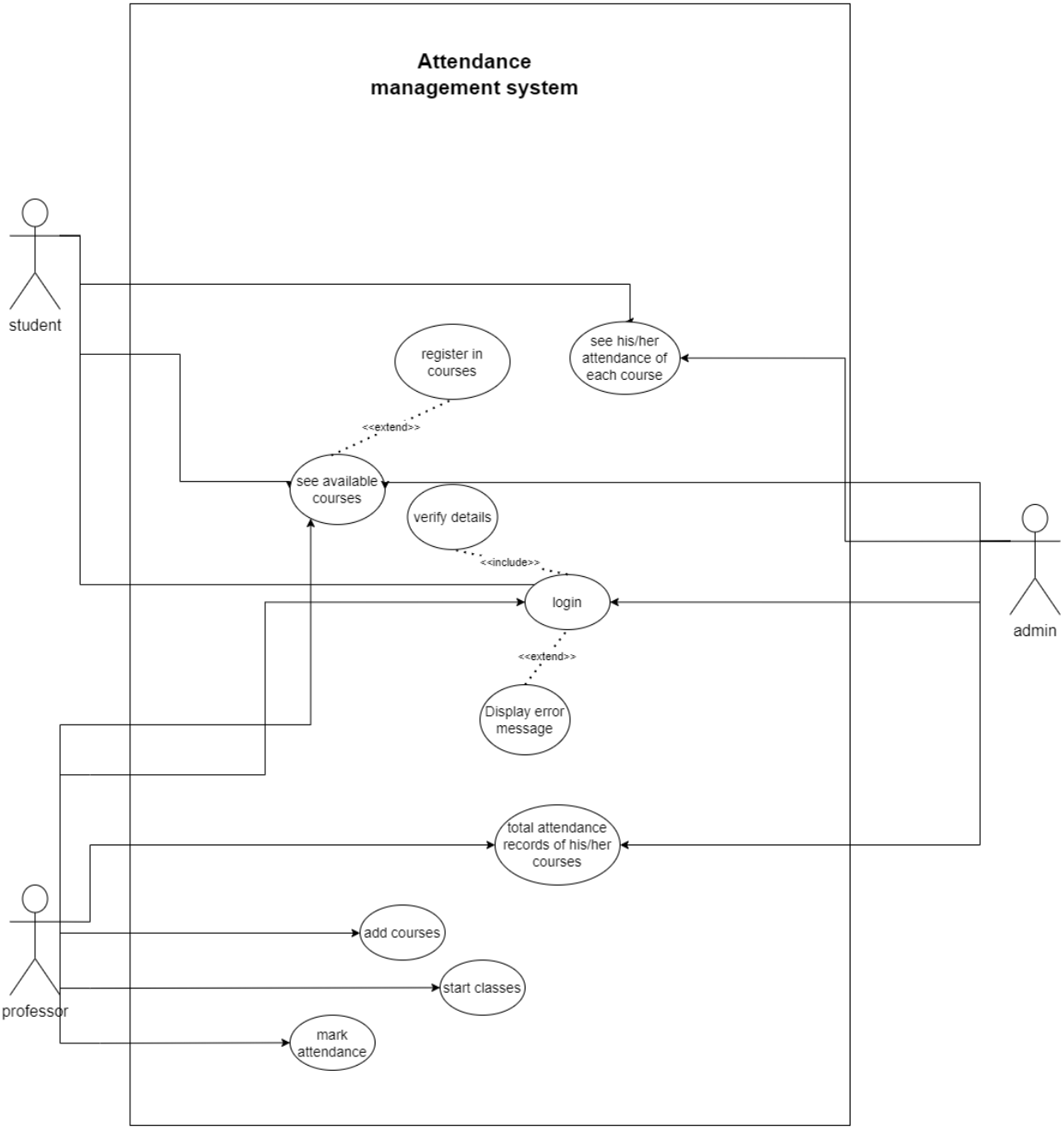
- Since Django uses Python, it leverages some of the fame and power of python to its own benefit.
- Django's community is one of the best things about it, they are helpful and actively working on making the framework more beginner-friendly and stabilizing the framework while adding new features.

Database:

MongoDB:

- Since NoSQL is required, MongoDB is the best choice available. The Document Data Model of MongoDB is a powerful way to store and retrieve data.
- Also the MongoDB is available in many major public clouds. MongoDB provides a good user experience and also provides a good scalable architecture.

Use-Case Diagram



Use case points (**UCP** or **UCPs**) is a software estimation technique used to forecast the software size for software development projects.

The method for determining the size estimate to develop a system is based on a calculation with the following elements:

- Unadjusted Use Case Weight (UUCW) – the point size of the software that accounts for the number and complexity of use cases.
- Unadjusted Actor Weight (UAW) – the point size of the software that accounts for the number and complexity of actors.
- Technical Complexity Factor (TCF) – factor that is used to adjust the size based on technical considerations.
- Environmental Complexity Factor (ECF) – factor that is used to adjust the size based on environmental considerations.

1> Unadjusted Use Case Weight (UUCW):

The UUCW is one of the factors that contribute to the size of the software being developed. First step here is to identify each use case as either simple, average or complex use cases which are determined by the number of transactions attached to the use case. Following is the table using which we classify each use case:

Use case classification	No. of transactions	Weight
Simple	1-3 transactions	5
Average	4-7 transactions	10
Complex	8 or more transactions	15

Classifying each use case from use case diagram:

Use Case Name	No. of Transactions	Classification
Login	5	Average
Verify details	2	Simple
Display error message	2	Simple
See available courses	3	Simple
Register in courses	3	Simple
See attendance of each course	6	Average
Total attendance	5	Average
Add course	8	Complex
Start class	6	Average
Mark attendance	6	Average

Use case complexity	Weight	Number of use cases	Product
Simple	5	4	20
Average	10	5	50
Complex	15	1	15
Total			85

Unadjusted Actor Weight (UAW)

The UAW is another factor that contributes to the size of the software being developed. It is calculated based on the number and complexity of the actors for the system. Following is the table that identifies the complexity of the actor.

Actor classification	Type of actor	Weight
Simple	External system that must interact with the system using a well-defined API	1
Average	External system that must interact with the system using standard communication protocols	2
Complex	Human actor using a GUI application interface	3

We have 3 actors in our use case diagram and each of which is a human actor using GUI interface and so their weight is 3.

UAW = (Total No. of Simple actors x 1) + (Total No. Average actors x 2) + (Total No. Complex actors x 3)

= 0 + 0 + 3 * 3

= 9

Technical Complexity Factor (TCF)

The TCF is one of the factors applied to the estimated size of the software in order to account for technical considerations of the system. It is determined by assigning a score between 0 (factor is irrelevant) and 5 (factor is essential) to each of the 13 technical factors listed in the table below

Factor	Description	Weight
T1	Distributed System	2.0
T2	Response Time	1.0
T3	End user efficiency	1.0
T4	Internal processing complexity	1.0
T5	Code reusability	1.0
T6	Easy to install	0.5
T7	Easy to use	0.5
T8	Portability to other platforms	2.0
T9	System maintenance	1.0
T10	Concurrent/ parallel processing	1.0
T11	Security features	1.0
T12	Access for third parties	1.0
T13	End user training	1.0

Assigning score to each of the factors and product of weight and score.

Factor	Score (out of 5)	Weight	Product
T1	0	2	0
T2	3	1	3
T3	4	1	4
T4	3	1	3
T5	3	1	3
T6	3	0.5	1.5
T7	5	0.5	2.5
T8	0	2	0
T9	5	1	5
T10	0	1	0
T11	4	1	4
T12	0	1	0
T13	5	1	5
Total (TF)			31

TCF = 0.6 + (TF/100)
= 0.6 + 31/100
= 0.6 + 0.31
= 0.99

Environmental Complexity Factor (ECF)

The ECF is another factor applied to the estimated size of the software in order to account for environmental considerations of the system. It is determined by assigning a score between 0 (no experience) and 5 (expert) to each of the 8 environmental factors listed in the table below.

Factor	Description	Weight
E1	Familiarity with development process used	1.5
E2	Application Experience	0.5
E3	Object oriented experience of team	1.0
E4	Lead analyst capability	0.5
E5	Motivation of the team	1.0
E6	Stability of requirements	2.0
E7	Part time staff	-1.0
E8	Difficult programming language	-1.0

Assigning score to each of the factors and product of weight and score.

Factor	Score	Weight	Product
E1	3	1.5	4.5
E2	2	0.5	1
E3	2	1	2
E4	3	0.5	1.5
E5	5	1	5
E6	4	2	8

E7	0	-1	0
E8	3	-1	-3
Total (EF)			19

ECF = 1.4 + (-0.03 x EF)
= 1.4 + (-.03 * 19)
= 1.4 - 0.57
= 0.83

Use Case Points (UCP)

Finally the UCP can be calculated once the unadjusted project size (UUCW and UAW), technical factor (TCF) and environmental factor (ECF) have been determined. The UCP is calculated based on the following formula:

UCP = (UUCW + UAW) x TCF x ECF

= (85 + 9) * 0.99 * 0.83
= **77.24**

Now that the size of the project is known, the total effort for the project can be estimated. For the Attendance Management System example, 4 man hours per use case point will be used.

Estimated effort = UCP * Hours/UCP
= 77.24 * 4
= **309 hours**