Review Test Submission: SemesterTest1

User	[redacted]
Course	COS 301 Y1 2023
Test	SemesterTest1
Started	4/3/23 5:30 PM
Submitted	4/3/23 8:00 PM LATE
Due Date	4/3/23 8:00 PM
Status	Completed
Attempt Score	57 out of 100 points
Time Elapsed	2 hours, 30 minutes out of 2 hours and 30 minutes
Instructions	**Examiner** Internal: Stacey Baror and Arne Schreuder External: Dr Dongmo Cyrille, University of South Africa **Instructions** 1. Read the question carefully and answer all the questions that follow. 2. If you plagiarise your submission, your marks will be forfeited (i.e., you earn a '0' mark), and you will face disciplinary action. 3. The test starts at 17:30 and stops at 20:00 4. You have 120 minutes to complete the paper, and 30 minutes is allocated to typing, editing and formatting your document - **Start time 17:30 - Stop time 20:00** 5. Type your answer in any software application of your choice, and when a drawing (modelling) is required, do so using the following **draw.io** or **visual paradigm** software. 6. A lecturer will be on COS 301 ClickUp Blackboard session **"SemesterTest Query" from 17:30-18:30** for error or omission queries related to the semester test questions. 7. Extra time students, your concerns are acknowledged; communicate with the Course Coordinator asap.
Results Displayed	All Answers, Submitted Answers, Correct Answers, Feedback, Incorrectly Answered Questions

Question 1 3 out of 15 points

1a.

Software Architecture is **not** the operational aspect of software development. What, then, is the usefulness of software architecture? *Backup your answers with a real-world example and ensure to present at least **five values of software architecture** with real-world examples to obtain full marks* [10] points

1b.

What is the role of architectural structure in software architect design? [5] points

Selected Answer:

1a) Software architecture is important in that it allows you to reason and manage changes to your system as the system changes over time. By analysing the architecture we can make predictions about how a system will perform. We can use software architecture as a tool that allows us to communicate effectively with stakeholders involved within a project. Software architecture also allows us to define constraints on a system and its implementation. Software architecture can restrict design alternatives, which allows developers to come up with creative solutions and also reduce the complexity of system design.

1b) Since software systems are made up of a variety of different kinds of structures, they can be grouped into categories. These categories can provide a high-level view of an entire system that makes it easy to explain a system to someone without the technical knowledge. This helps us meet stakeholders requirements and expectations as they can understand the system and provide feedback. It also helps to indicate which parts of the system interact with each other and how they interact with each other. It is useful in brigning together the un

Correct Answer:

1a:
A student that presents two or three importance of SA (as shown below) with a real-world example should obtain full marks - real-world example applied to SA assign [4 points]
• **DEFINE:** Software architecture determines the quality attributes (requirements). The architecture is not the operational software. Instead, it is a representation that enables a software engineer to
– Analyze the effectiveness of the design in meeting its stated requirements, Consider architectural alternatives at a stage when making design changes is still relatively easy, and
– Reduce the risks associated with the construction of the software.
• Software architecture provides a representation that facilitates communication among all stakeholders.
• The architecture highlights early design decisions that will profoundly impact all software engineering work that follows.
• The architecture constitutes a relatively small model of how the system components are structured and work together
1b.
Architectural structures are in 3 categories:

- Design
- Documentation and
  - Analysis of architectures: Component-and-connector structures
  - Module structures
  - Allocation structures

Response Feedback: [None Given]

Question 2 3 out of 12 points

You have been tasked with developing a 'social network' app for the mini project. Following the software engineering life-cyle, present a case study of the 'social network' app's development life cycle [12] points

Selected Answer: During the planning phase we decided what type of social media application our team wanted to build, the requirements that it would meet as well as the features the application needed to meet our stakeholders needs. Hence we created a project plan. We then went to the defining stage where we defined what exactly the application would do, how it would use time as a social currency, the features it would have and the requirements it would meet. This was sent to the project owner to make sure we were meeting their needs. We then started with the design phase where we created wireframe diagrams and mock diagrams on how the application would look. We used Figma for this process. We also created database models and entities to plan how the design of the database would be. The implementation phase then began where the UI-engineers began to develop the front-end of the application according to the designs we had. Mock data and skeletons/scaffolding was used. The implementation phase then began where the skeletons and mocks were implemented according to their actual functions and state functionality was added to the UI. The API was created and end-points were also created. The testing phase began where unit tests and integration tests and were created. When code is pushed on GitHub it is first checked using a Linter, and the unit tests and integrations tests are automatically run to make sure the code is up to standard. A tester also literally tests the software to make sure it is up to standard and to spot bugs. We then reached the deployment phase where a live version of the application could be deployed using firebase and firestore. Hence a user could access the application through a link and view the application through a mobile view-port. Usually at this point the application would need to be maintained through regular updates and fixes.

Correct Answer:

1. Development process [4] points - to obtain full points students must explain each aspect.

- Productivity
- Software development and maintenance activities
- Models to perform the activities

2. Quality assurance [4] points -to obtain full points students must explain each aspect.

- Quality
- Verification
- Validation

3. Project management [4] points - to obtain full points students must explain each aspect.

- Cost + time

Response Feedback: [None Given]

Question 3 10 out of 10 points

At a high level, the software engineering process is broken down into five steps/phases. List these steps/phases and explain what happens in each step in the context of your mini-project. [10] points

Selected Answer:
1. Requirements Gathering/Analysis: Our team decided on an idea for our application, and wrote down the requirements it meets according to the requirements given to us.
2. Design: Our team created wireframe designed of our proposed product and then also created mock-designs using figma.
3. Implementation: Our UI designers began creating the front-end design using Ionic Angular, nrwl and other technologies. Our API engineer, integeration engineer and data engineer began to implement our back-end by setting up firestore, the database structure and creating the API itself using technologies like CQRS and JEST. Scaffolds/skeletons of code was first implemented and then filled in with the full implementation.
4. Testing: Unit tests, integration tests and pipeline tests were created. When code is pushed on GitHub it is first checked using a Linter, and the unit tests and integrations tests are automatically run to make sure the code is up to standard. A tester also literally tests the software to make sure it is up to standard and to spot bugs.
5. Deployment: The app was deployed live using firestore so that it could be accessed from a mobile-view port with anyone who has a link to the application.

Correct Answer:
1. **Requirements:** The client's needs are gathered and formulated into formal requirements. These requirements are captured in a requirement specification. Business analysts and project managers help formulate these, along with the input of other roleplayers.
2. **Design:** During this step, the designs of various components are done. These include UI design, architecture design, UX design, entity model design, UML diagrams etc.
3. **Implementation:** This is the phase at which the requirements are implemented and engineered in code. This goes hand in hand with unit and integration testing executed by engineers.
4. **Testing**: This phase involves formal testing, including but not limited to unit and integration testing, usability and QA testing. This phase is meant to help validate the proper implementation of the requirements.
5. **Delivery**: During this phase, the deployment or delivery of the software system is done. This usually involves the automated deployment of various systems. This phase also includes finalising a chunk of the software engineering process.

Response Feedback: [None Given]

Question 4 9 out of 10 points

Name and explain the purpose of each role in your group. i.e., project owner = The client [10] points

Selected Answer:
The project manager is responsible for making sure that there is a deliverable that can be presented by the end of the project. They organise meetings, coordinate tasks between group members and hold group members accountable for their work.
The Project Owner is the lecturers in this case who is the client we are building the application for.
The Business Analyst is communicating with the stakeholders and project owner to ensure that we are meeting their expectations and requirements, and also to receive clarification on any business-related questions that effect the software being produced. They are also working on comprehensive documentation of the system that is being built.
The Designer's purpose is for making mock-designs and wireframes of the product before it begins production. They take the conceptualised ideas and put it into a form that can be viewed as an application.
The UI Engineer's purpose is to design the front-end of the application, using technologies like Ionic-Angular and ngsx and nrwl. They create the user interface from the designs that the designer created.
The Integration Engineer's purpose is ensuring that the back-end services and API as well as the front-end services work together seamlessly. They take the work from the front-end and back-end and make sure they are compatible with eachother.
The tester uses the software after certain changes have been made to make sure it is working as expected and to find any bugs or improvements needed. They are also documenting their experience while using the software, noting any issues they may find so it can be sent back to the developers to fix. They are part of the software quality assurance aspect of the solution. Hence, they are involved directly in quality management and process improvement when they test the product being made.
DevOps role is automating the CI/CD pipeline by automating integration tests, unit tests and pipeline tests.
The Data Engineer is responsible for creating the schema and structure of the database that will be used. They work closely with creating entities and modelling them to create a database system according to standards they set out.
The Services Engineer's purpose is to create tests, and provide assistance between those working on the API, the requests and the responses. They are also providing assistance with live deployment of the application.

Correct Answer:
Mark any five roles and explanations.
1. **Project Manager/Lead:** Project coordinator and day-to-day manager. Responsible for the management of members and their responsibilities.
2. **Business Analyst**: Responsible for dissecting the client requirements and capturing that in formal specifications that can be given to the developers.
3. **Designer:** Responsible for the creative design of the UI and various aspects related to UX.
4. **UI/Frontend engineer:** Engineering role responsible for implementing the client-side frontend code.
5. **Integration/API Engineer:** Engineering role responsible for the integration aspects between clients and backend services. Usually implements the APIs.
6. **Services/Backend Engineer**: Engineering role responsible for the backend business logic code that lives in services.
7. **Data Engineer:** Engineering role responsible for the implementation of data persistence and data design.
8. **Tester:** QA and formal testing role.
9. **DevOps:** Responsible for Git, CI/CD, deployments etc.

Response Feedback: [None Given]

Question 5 27 out of 48 points

Using the LinkedIn system, in line with the software functional and architectural requirements discussions, do the following.

1. List **seven subsystems of the LinkedIn system** [3.5]points

2. For each subsystem of the LinkedIn system listed above, **list a minimum of three functions** of each subsystem [7 X 3] = [10.5] points.

3. Draw **ONE use case diagram** that consists of the **seven (7) subsystem**s of the LinkedIn system you listed above. Each subsystem should **also have its three (3) functions** [3.5 + 10.5] = [14] points (You can UPLOAD UseCase Diagram below)

4. For the LinkedIn system, based on the functional requirements you have listed above, list and explain at least seven (7) quality requirements [7] points

5. Identify **four (4) architectural patterns** that best address and align with the requirements you have identified so far and **describe how the architectural patterns should work together** to achieve the **LinkedIn system's goal** as in your functional requirements --- [9]---- [13] points

Selected Answer:

1.
-User Authentication Subsystem
-Profile Management Subsystem
-Recomendation Subsystem
-Messaging Subsystem
-Job Application Subsystem
-Job Search Subsystem
-Job Advertisement Subsystem

2.
User Authentication Subsystem:
1. The user should be able to login with their credentials to access their account
2. The user should be able to logout of their account when done with their session.
2. The user should be alerted if their login credentials are incorrect
3. The user should be able to reset their password if they have forgotten it.

Profile Management Subsystem:
1. A user should be able to update their profile picture and personal details
2. A user should be able to add their qualifications and achievements to their profile
3. A user should be able to add their current and previous places of employment to their profile

Recomendation Subsystem:
1. A user should be recommended jobs according to their qualifications.
2. A user should be alerted if a job is posted that matches their interests.
3. A user should be recomended to other users who are searching for candidates for a specfic job.

Messaging Subsystem:
1. A user should be able to message prospective employers for job enquiries.
2. A user should be able to message other users who they may want information from.
3. A user should be able to receive messages from hiring agencies who are interested in hiring them for a specific role.

Job Application Subsystem:
1. A user should be able to upload their CV
2. A user should be able to submit additional supporting documents such as their degree and other qualifications
3. A user should be able to apply for a specific role that is available.

Job Search Subsystem:
1. A user should be able to search for a job that matches their interests.
2. A user should be able to filter results according to specific criteria.
3. A user should be able to search for companies they are interested in working at.

Job Advertisement Subsystem:
1. Prospective employers should be able to upload job positions that are available.
2. Prospective employers should be able to list requirements in order to apply for a position.
3. Hiring agenies should be able to send specific job advertisments to users they want to apply for a job.

3. Uploaded use-case diagram
4. Quality requirements:
- Reliability: The system needs to maintain a low-downtime, if any, so that users can reliably access their accounts and use the application whenever they wish to.
-Security: The system needs to securely store the users login information which would include their personal details, passwords etc.
-Compatibility: The system should be compatiable with other hiring platforms so that users can use their LinkdIn profile to apply for jobs on other websites/applications. An example would also be allowing users to message via linkdin but also recieve these notifcations through emails.
-Usability: The system should be effective in allowing users to apply for jobs, update their information and search for positions. It should do this accurately to make it effective and usable.
-Performance: The system should not be laggy, provide fast-response time to users when they search or apply for jobs or message other people.
-Maintainability: The system should be effective and efficient to maintain so that updates to the product be easy to integrate and roll out for the developers.
-Portability: As well as being able to access LinkdIn and all of its functions online through the desktop website, the same level of usability should be provided on the mobile application and mobile website.

5. The four architectural patterns I have identified are: Model-View-Controller (MVC) Architecture, Layered Architecture, Monolithic Architecture and Microservices Architecture. The MVC architecture can be used to provide seperation of concerns between different functions so that if one fuction starts working incorrectly, it does not prevent the others from working incorrectly. For example, it can be used to seperate the functionality for a users ability to update their profile picture and change their password. Hence if the business logic of changing a users profile picture somehow stops working, they can still change their password.

Correct Answer:

Individual students' answer is evaluated to assess their understanding of the lectures and assignments on software architecture design

Response Feedback:

5.1 - is 4 sub system the following were treated as one subsys - 2points

Job Application Subsystem

-Job Search Subsystem

-Job Advertisement Subsystem

5.2 - 8 points

5.3 - will be added as in the final sheet to combine as one semester mark.

5.4 - 7 pts

5.5 - 8 - explanation not detailed enough.

Question 6

5 out of 5 points

Evaluate your contributions to the mini-project.

1. What have you contributed to your team and the mini-project [2]?

2. Is there any area you need to improve to enable you to excel in the capstone project? How will you go about achieving this [2]?

3. Grade your **contributions to the mini project out of 100** based on your evaluation above [1]?

Selected Answer:	1. Contributions to my team as Project Manager: -Lead 3 meetings a week (in-person, Discord and Blackboard) -Ensures each member of the team knows what they are responsible for doing -Assign work and to each member of the team and hold them accountable for it -Use GitHub and the GitHub issue system to assign tasks to specific members -Make sure that the relevant sub-teams such as front-end and back-end are coordinating correctly to achieve what should be done -Helped with the designs created in Figma -Assist business analysts in communicating with clients when clarification is needed -Involved in knowing the high-level workings in the back-end and front-end to understand our system. -Lead presentations for Demo's -Reviewing the work of members to close corresponding issues if their work is satisfactory. 2. Yes, I can improve my project management skills by making use of more GitHub tools such as project boards, which I had only recently learnt about. These tools will help to organise the tasks my team members need to complete and provide it to them in a view that can show deadlines and everyones progress. In the Captstone project, I can immediately make use of the issue system on GitHub in conjunction with the project board feature of GitHub so that members can easily see what they are responsible for completing from the beginining of the project. This will lead to a more certain project success in the Capstone project. 3. 100/100. This is because I have fulfilled the responsibilities that a project manager should and have assisted other members with parts of their work when needed.
Correct Answer:	Students are evaluated individually.
Response Feedback:	[None Given]

Tuesday, October 10, 2023 12:08:51 PM SAST

← OK