1. **Case (100 point)**

During the COVID-19 pandemic situation, most of business processes are forced to shift the daily operation from onsite to online. Library in your university is facing the same challenge to provide best services for lecturer and student. In order to facilitate the implementation of online services, a web application will be developed with following main functions:

* Borrowing and returning book through delivery services or instant courier services.
* Online chat for consultation with Librarians.
* Fine payment through QRIS that is supported by most of e-wallet in Indonesia.
* Online reference services that cover any inquiries related to information literacy.
* Queuing system that allows user to request enter access to library (in limited number and at appointed time).

As a software developer, you need to analyze the system with following guidelines:

1. **(LO 1, 20 point)** **Determine the best software development life cycle** to develop the application. **Choose between: waterfall, incremental, prototyping, or scrum**. **Explain the reason and add several assumptions to support your methodology**.

**Answer:**

**As it is online booking system, requirements needed to be changed regularly** based on the availability of books, no of books, finding a librarian consultant ,keeping a database of the books and librarians.

**Unclear User Requirement like Borrowing and returning book**, are the books returning needs to be group by certain rules or not, and delivery services used is not stated in the Case.

**Short Time Schedule like allows user to request enter access to library (in limited number and at appointed time)**. So there is offline schedule in this Study case Situation, must develop the app to handle this functions in a fast and reliable way.

**Strong Project Management like Online chat for consultation with Librarians** so user can complaint or ask something about their problem in library such as borrowing, payment, returning, etc.

**Cost limitation like payment through QRIS, that support E-Wallet in Indonesia** so it is easy to track and easier for financial records, reduce paper used, that can used excel and other technology tools to develop it.

**Visibility of Stakeholders like Online reference services that cover any inquiries related to information literacy** so stakeholders and other end user can monitor the progress development, legal of the books, literature information, etc.

**Scrum is the best method for re usage of rebuilding of the application based on current requirements** needed to change like Unclear User Requirement, Short Time Schedule, Strong Project Management, Cost limitation, Visibility of Stakeholders.

**Although the best must have disadvantages** like the ability and collaboration of the customer to express user needs, Documentation is done at later stages, Needs special skills for the team.

**Ability and collaboration of the customer to express user needs** here means that in Scrum, communication between User and Project team should be as often as possible. So, if there misunderstanding in the beginning, the Scrum Sprint will be delayed too.

**Documentation is done at later stages** because in scrum done using sprint for the development, so there many changes for the current requirement. Team can do the documentation in stable sprint condition so doesn’t Re-write the documentation again.

**Needs special skills for the team** because Scrum is known as rapid development. So, the team involved the project with this cycle development must have skills that can be used in this rapid environment so the probability of Sprint Delayed can be minimized and Project can do in time.

1. **(LO 1, 20 point)** Based on the case study, **create draft activities for each process** in your methodology. The **activity explanation is not only based on theory, but also the specific implementation** (what will you do in that phase) according to the case study.

**Answer:**

1. **Define Development Team**

* **Development team** is **responsible for developing the core system with technical development**. It converts the user stories in the usable software.
* **Team is comprised of 7 members**. These members all have a **combination of competencies and can include developers, testers, support, designers, business analysis, etc**.
* All the members continuously work closely together. The team itself **oversees delivering shippable product increments by the end of each sprint**.

1. **Define User Stories**

**Lecturer:**

* Story 1: As a lecturer I want to be able to access to library.
* Story 2: As a lecturer I want to be able to Borrow book through delivery services or instant courier services.
* Story 3: As a lecturer I want to be able to Return book through delivery services or instant courier services.
* Story 4: As a lecturer I want to be able to Online chat for consultation with Librarians.
* Story 5: As a lecturer I need to be able to access Online reference services that library has.

**Students:**

* Story 1: As a student I want to be able to access to library.
* Story 2: As a student I want to be able to Borrow book through delivery services or instant courier services.
* Story 3: As a student I want to be able to Return book through delivery services or instant courier services.
* Story 4: As a student I want to be able to Online chat for consultation with Librarians.
* Story 5: As a student I need to be able to access Online reference services that library has.

**The Rector University:**

* As a rector I want to be able to post new announcement or any change in policy to the system.
* As a rector I want to be able can directly talk to any lecturer or student related to any university matter.
* As a rector I want to be able to view the reports corresponding to each lecturer, library member’s and student. At all three levels, there should be report with certain performance metrics in report.

**Library Administrator:**

* As a library administrator I want to be able to add a new books to the system and set detail such as title, author, subject category as well by the publication date, and Unique Identification Number.
* As a library administrator I want to be able to assign how much fines will be deducted if member late to returned books after the due date.
* As a library administrator I want to be able to update the total of the books include the copy of each book, in case there is books went missing or misplace.

**Library IT Manager**

* As a library IT manager I want to be able to Ensure that all the entities involved have the proper privileges and there should not be any information leakage due to inappropriate privileges.
* As a library IT manager I want to be able to Ensure the network traffic on the system in manageable and system runs smooth with a good performance.
* As a library IT manager I want to be able to Develop a backup mechanism in case of database inconsistency or database failures.

1. **Define Sprint length**

* **There will be one (1) sprints**.
* **Sprint takes 14 days**.

1. **Appoint a Scrum Master**

* **Scrum Master** role is **to make the team process oriented**. All the activities of the Scrum Life Cycle are followed with due diligence are taken care be Scrum Master.
* **So, Scrum Master will be** **Project Manager** as he would be **aware about the progress of the development and team itself**.

1. **Appoint Product Owner**

* **Product owner’s** role is to **define the user stories and create a process as to how we will be developing the software/system**. Also takes the lead in defining the core features that the system should have.
* **So, Product Owner will be** **Library IT Manager** as he would be **aware about the software development process**.

1. **Create Initial Product Backlog**

* **Any library member should be able to search books** by their title, author, subject category as well by the publication date.
* **Each book will have a unique identification number** and other details **including a rack number** which will help to physically locate the book.
* There could be more than one copy of a book, and library members **should be able to check-out and reserve any copy**. I will call each copy of a book, a book item.
* The system should be **able to retrieve information like who took a particular book** or what are the books checked-out **by a specific library member**.
* There should be a **maximum limit (5) on how many books a member can check-out**.
* There should be a **maximum limit (10) on how many days a member can keep a book**.
* The **system should be able to collect fines for books returned after the due date**.
* Members should be **able to reserve books that are not currently available**.
* The system should be **able to send notifications whenever the reserved books become available**, as well as when the book is not returned within the due date.
* Each book and member card will have a unique barcode. The system will be **able to read barcodes from books and members’ library cards**.

1. **(LO 2, 30 point)** **Explain and give the result of requirement engineering** based on the case study **Inception, Elicitation, Elaboration**

**Answer:**

1. **Inception**

* Inception is a task where the requirement engineering understands the problem.
* It collaborates with the relationship between the customer and the developer.

**Before First Sprint begin, there will be:**

* Proof of Concept (Feasibility Check) will be done for the outstanding items.
* Any impediment or blockers will be resolved to start the actual development.
* List of all books such as title, author, subject category as well by the publication date, unique identification number, total copy of book item for each book , and rack number which will help to physically locate the book.
* List of all Student, Library Staff and Lecturer such as unique barcode, and members’ library cards.
* List of all delivery services or instant courier services and List of all E-wallet that this project used and support QRIS.
* Total Library staff that job for Online chat consultation and all identification such as unique barcode, and members’ library cards.
* List of all Online reference services that want to use for covering any inquiries related to information literacy.
* What kind of notifications use to know whenever the reserved books become available, as well as when the book is not returned within the due date (Email/SMS/WhatsApp/etc.).
* How much fines will be deducted if member late to returned books after the due date.

1. **Elicitation**

* This step is concerned with **identifying the overall problem** the software is attempting to solve, **proposing solutions** to solving the problem.
* **Sprint Planning Activity**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| LOGIN | UI(1) | Database | Password Validation (3) | Testing (4) | |  |  |
| Preparation (2) |  |  |
| Donald | Mickey | Louie | Minnie | |  |  |
| 3 hrs | 3 hrs | 4 hrs | 3 hrs | |  |  |
| Book Order | UI(5) | Reading | Order Online (7) | Delivery Service (8) | | Testing (9) | |
| On the Spot (6) |
| Minnie | Dewey | Mickey | Huey | | Daisy | |
| 8 hrs | 15 hrs | 6 hrs | 6 hrs | | 4 hrs | |
| Book Preparation | UI(10) | CRUD Menu (11) | Testing (12) |  |  |  |  |
|  |  |  |  |
| Donald | Louie | Minnie |  |  |  |  |
| 6 hrs | 15 hrs | 4 hrs |  |  |  |  |
| Payment | UI(13) | Process | Prepare for Delivery (15) | Testing (16) | |  |  |
| Payment (14) |  |  |
| Minnie | Huey | Dewey | Daisy | |  |  |
| 4 hrs | 14 hrs | 3 hrs | 4 hrs | |  |  |
| Reporting | UI(17) | Reports (18) | Testing (19) |  |  |  |  |
|  |  |  |  |
| Donald | Mickey | Daisy |  |  |  |  |
| 4 hrs | 15 hrs | 5 hrs |  |  |  |  |

* **Daily Plan for the Sprint**

Table

Description automatically generated

**The development went according to schedule, except for the following tasks (Problem):**

* Day 2 Dewey has a slight delay in task 6. The delay was for 1 hour.
* Day 3 Minnie (task 4) and Louie task 3) have completed their tasks.
* Day 5 Donald encountered problem, a delay of 1 hour, therefore the estimated completion is 6 hours. Huey also has a delay of 1 hour in task 8.
* Day 9 Huey and Mickey encountered problems in task 14 and task 18 respectively. A delay of 4 hours for Huey and delay of 3 hours for Mickey.
* Day 10 everyone manages to catch up except for Huey. He still needs 14 hours to complete his work.
* Day 11 finally Huey caught up a little. At this point he needs 8 hours to complete task 14. Donald has completed task 17.
* Day 12 Huey needs 6 hours to complete task 14.
* Day 13 Huey needs 3 hours to complete task 14.
* Day 14 everyone has completed their tasks.

**Opportunity to do Things Differently (Proposed Solution):**

* Task 8 (Delivery Service) and Task 15 (Prepare for Delivery can be built in one function requirement.
* Task 6 (Reading on The Spot) and Task 7 (Order Online) can be done in one step of requirements, because it is same as buying food/drink.
* Make Sprint Planning more flexible by doing it in 2 or more Sprint.
* This Project can be done using with Swarming Techniques.
* Recruit more people if still want to do it in 2 weeks or the hours each task can be extended

1. **Elaboration**

* Analysis model that represents information, functional, and behavioral aspects of the requirements.
* **Worked Well**
* **Minnie** has done a very good job in User Interface functions requirement. From 2 tasks, all of them done completely without any delay.
* **Donald** has done a very good job in User Interface functions requirement. From 3 tasks, only 1 times delay and only 1 hour of delay.
* **Daisy** has done a very good job in Testing functions requirement. From 3 tasks, all of them done completely without any delay.
* **Dewey** has done a very good job in Reading on The Spot Function and Prepare for Delivery Function, with only 1 hour of delay in Reading on The Spot.
* **Louie** has done a very good job in Password Validation and CRUD Menu, all tasks done with no delay.
* **Didn’t Work Well**
* **Huey** is not very good at doing his job in Process Payment functions requirement, because there is a lot of delay happened on that task.
* Not divided into several sprints, but 1 sprint run over 2 weeks, it is to Overly Optimistic Schedules.
* There is some task that the person who work on that task had less knowledge and skills in that task.
* There is a contradiction on the Planned Sprint, where Testing done first before the other task completed. For example in task 9.
* The lack of people to do on this project is because the time each task is made is very small, causing a lot of delay.
* **Proposed Solution**

**Make this system in 2 sprints rather than 1 sprint.**

**Each Sprint takes 7 days.**

* **Sprint 1 ( 7 days)**
* **Sprint Planning Activity**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Book**  **Preparation** | **UI (1)** | **Database Preparation (2)** | **CRUD Menu (3)** | **Testing (4)** |  |
|  |
| **Donald** | **Mickey** | **Louie** | **Daisy** |  |
| **10 hrs** | **15 hrs** | **15 hrs** | **10 hrs** |  |
| **Book Order** | **UI (5)** | **Reading on The Spot (6)** | **Online Order (7)** | **Delivery Service (8)** | **Testing (9)** |
|  |
| **Minnie** | **Dewey** | **Mickey** | **Huey** | **Daisy** |  |
| **15 hrs** | **15 hrs** | **15 hrs** | **10 hrs** | **10 Hrs** |  |
| **Payment** | **UI (10)** | **Process Payment (11)** | **Prepare for delivery (12)** | **Testing (13)** |  |  |
|  |  |
| **Donald** | **Huey** | **Huey** | **Daisy** |  |  |
| **15 hrs** | **15 hrs** | **13 hrs** | **10 hrs** |  |  |

* **Daily Plan for the Sprint**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Task | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 |
| Donald (1) | 10 | 5 | 0 | 0 | 0 | 0 | 0 |
| Mickey (2) | 15 | 10 | 5 | 0 | 0 | 0 | 0 |
| Louie (3) | 15 | 10 | 5 | 0 | 0 | 0 | 0 |
| Daisy (4) | 10 | 5 | 0 | 0 | 0 | 0 | 0 |
| Minnie (5) | 15 | 10 | 5 | 0 | 0 | 0 | 0 |
| Dewey (6) | 15 | 10 | 5 | 0 | 0 | 0 | 0 |
| Mickey (7) | 15 | 15 | 15 | 15 | 10 | 5 | 0 |
| Huey (8) | 10 | 5 | 0 | 0 | 0 | 0 | 0 |
| Daisy (9) | 10 | 10 | 10 | 5 | 0 | 0 | 0 |
| Donald (10) | 15 | 15 | 15 | 10 | 5 | 0 | 0 |
| Louie (11) | 15 | 15 | 15 | 15 | 10 | 5 | 0 |
| Huey (12) | 13 | 13 | 13 | 8 | 3 | 0 | 0 |
| Daisy (13) | 10 | 10 | 10 | 10 | 10 | 5 | 0 |
| Total | 168 | 133 | 98 | 63 | 38 | 15 | 0 |

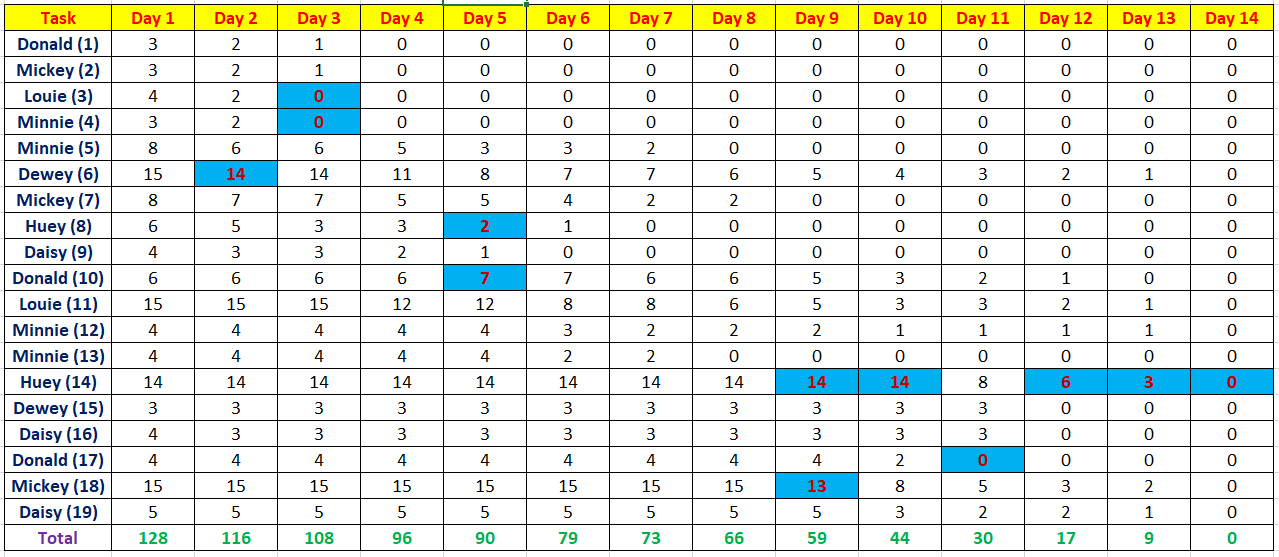
* **Sprint 2 (7 days)**
* **Sprint Planning Activity**

|  |  |  |  |
| --- | --- | --- | --- |
| **Login** | **UI (1)** | **Password Validation (2)** | **Testing(3)** |
|  |
| **Donald** | **Minnie** | **Huey** |  |
| **2 hrs** | **15 hrs** | **3 hrs** |  |
| **Reporting** | **UI (4)** | **Reports (5)** | **Testing (6)** |  |
|  |
| **Donald** | **Dewey** | **Huey** |  |
| **3 hrs** | **15 hrs** | **4 hrs** |  |

* **Daily Plan for the Sprint**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Task | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 |
| Donald (1) | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| Minnie (2) | 15 | 12 | 9 | 6 | 3 | 1 | 0 |
| Huey (3) | 3 | 1 | 0 | 0 | 0 | 0 | 0 |
| Donald (4) | 3 | 3 | 3 | 2 | 1 | 0 | 0 |
| Dewey (5) | 15 | 12 | 9 | 6 | 3 | 1 | 0 |
| Huey (6) | 4 | 4 | 4 | 3 | 2 | 1 | 0 |
| Total | 42 | 33 | 25 | 17 | 9 | 3 | 0 |

* **Actual Sprint**



1. **(LO 2, 15 point)** **Explain the difference between system description, analysis model and design model**. **Add example from the case study to support your answer**.

**Answer:**

**The System Description** is functions that want to be develop along the project, for this case study, Borrowing and returning book through delivery services or instant courier services. Online chat for consultation with Librarians. Fine payment through QRIS that is supported by most of e-wallet in Indonesia. Online reference services that cover any inquiries related to information literacy. And Queuing system that allows user to request enter access to library (in limited number and at appointed time).

**The analysis model** represents the external, higher level or logical view of the system (the more abstract conceptual view). By knowing that the specified function has perform as it was expected to perform

**The design model** represents the internal, lower level or physical view (the more concrete implementation view). By knowing that each internal unit inside a product are performed according to specification

**The first test is done with Black Box Testing**, and **the second test is done with White Box Testing**. Both testing is important to be implemented.

**When black box testing**, do not have to consider how the functions are working, how they are processing data and giving the result. Only must focus on whether the function is doing what it was supposed to do.

**When white box testing**, basically testing the internal functioning of the product like how data is received and output is being generated, testing the code, etc. And there is always a possibility of errors which is not possible for the black box testing to identify.

**Example from Case Study is in Notification system that required message by system on daily basis** **(System Description)**. **When Perform success on notification (Analysis Model)**, but **Message Sending doesn’t belong to specific user order (Design Model)**. In such way that complete project development process got become complex

1. **(LO 2, 15 point)** **Make an interface design for the application by using story boards** **(choose 3 functions)**.

**Answer:**

1. **Function 1 ()**
2. **Function 2 ()**
3. **Function 3 ()**