**IS4301 Agile IT with DevOps 2022**

**Open Book Assignment**

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| **Name:** |  |
| **Matric number:** |  |
| **Email:** |  |
| **Sprint team:** |  |

***Instructions:*** *Complete the questions below using this document and name your file “<<Your name>> IS4301 2022 Assignment.doc”. Upload your completed assignment into LumiNUS Assignment Submission folder with time stamp no later than 0800 hours Nov 4th 2022. Only one submission is to be uploaded. There is a penalty of 20% of total mark for < 2 days of late submission, 40% penalty for 3-7 days. No submission will be accepted after 11th November 2022.*

*Gentle reminder regarding NUS Code of Conduct and Plagiarism:* [*http://www.cdtl.nus.edu.sg/ta-handbook/academic-integrity.htm*](about:blank)*. It is important to note that****plagiarism****is an academic offence that is taken very seriously by the University, as stated in the****NUS****Code of Student Conduct.*

This open book assignment constitutes 40% of your total grade for this course.

Composition of Questions:

|  |  |  |
| --- | --- | --- |
| **Questions** | **Allocated Marks** | **Actual Marks** |
| 1 (Iterative planning) | 10 |  |
| 2 (Estimations) | 14 |  |
| 3 (User story development) | 20 |  |
| 4 (Microservices Architecture) | 22 |  |
| 5 (Coding – gitflow) | 5 |  |
| 6 (Coding – client side) | 15 |  |
| 7 (Coding – server side) | 10 |  |
| 8 (Branching) | 4 |  |
| TOTAL | 100 |  |

**Question 1 (10 marks)**

1. Suppose an Epic consists of estimates for eight user stories as shown in below table.
   1. Complete the column Bang-for-the-Buck. (2 marks)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Story Points**  **(estimated by developers)** | **Value Points**  **(estimated by product owner)** | **Bang-for-the-Buck** |
| **User Story 1** | 34 | 144 |  |
| **User Story 2** | 21 | 55 |  |
| **User Story 3** | 55 | 89 |  |
| **User Story 4** | 13 | 21 |  |
| **User Story 5** | 34 | 55 |  |
| **User Story 6** | 2 | 2 |  |
| **User Story 7** | 8 | 2 |  |
| **User Story 8** | 55 | 1 |  |

* 1. The sprint team who implements this epic has a velocity of 55 story points over a two-week sprint. Suppose there is an implementation dependency where user story 3 must commence first over the rest of user stories, complete the table below for planned iterations in implementing this epic. Add a row to the table below for each planned iteration to complete this epic. (4 marks)

|  |  |  |  |
| --- | --- | --- | --- |
| **Planned Iteration** | **User Stories in Iteration** | **User Story Points for this Iteration** | **Value Points for this Iteration** |
| 1 | User Story 3 | 55 | 89 |
| 2 |  |  |  |

* 1. Must all iterations be implemented to complete implementation of this epic? Explain your reason with respects to your planned iterations above. (2 marks)

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| --- | --- |
| **Answer:** |  |

1. Draw the burn-down chart for this epic. (2 marks)

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| **Burn-Down Chart:** |  |

**Question 2 (14 marks)**

1. In an epic, Iteration 7, which consists of the following two user stories, was completed over 10 days in a two-week sprint:

|  |  |  |
| --- | --- | --- |
|  | **Story Points** | **Value Points** |
| **User Story 71** | 5 | 13 |
| **User Story 72** | 8 | 8 |

* 1. What is the velocity of Iteration 7? Show your calculation. (2 marks)

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| --- | --- |
| **Answer:** |  |

* 1. How long is a story point in hours for this Iteration? Show your calculations. (2 marks)

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| --- | --- |
| **Answer:** |  |

After completion of Iteration 7, a backlog of 6 user stories remains:

|  |  |  |
| --- | --- | --- |
|  | **Story Points** | **Value Points** |
| **User Story 81** | 5 | 5 |
| **User Story 82** | 8 | 3 |
| **User Story 83** | 3 | 2 |
| **User Story 84** | 8 | 3 |
| **User Story 85** | 5 | 2 |
| **User Story 86** | 21 | 3 |

* 1. Which user stories will be planed for in Iteration 8? Explain your answer. (4 marks)

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| **Answer:** |  |

* 1. How long is the backlog of these 6 user stories in terms of remaining user story points, number of hours required to implement this backlog, and estimated number of iterations needed after Iteration 7? Show your calculations. (6 marks)

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| **Answer:** | Story Points remaining:  Estimated number of hours required for this backlog:  Estimated number of iterations needed to complete backlog: |

**Question 3 (20 marks)**

1. From your chosen Fintech Statement in your agile team project,
   1. Depict 5 user stories which you developed personally (10 marks)

|  |  |
| --- | --- |
| Sprint Team:  Fintech Statement: | |
| User Story 1 | <<User Story and estimates>>  <<Acceptance Criteria>> |
| User Story 2 |  |
| User Story 3 |  |
| User Story 4 |  |
| User Story 5 |  |

* 1. For each user story, explain how each of them satisfies the INVEST principle. (10 marks)

|  |  |
| --- | --- |
| User Story 1 |  |
| User Story 2 |  |
| User Story 3 |  |
| User Story 4 |  |
| User Story 5 |  |

**Question 4 (22 marks)**

1. From the “Online Product Purchase” example on slide 11 of Lecture 6:

|  |
| --- |
| **Online Product Purchase**   * Search online product catalogue * Add product to cart * Check out * Create new account * Specify mode of payment * Specify payment details * Specify email address * Specify mailing address * Complete order * Verify purchase details * Complete card transaction * Print completed order |

1. Draw a possible Service Oriented Architecture design for this Online Product Purchase example. (4 marks)

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|  |

1. Draw a possible Microservices Architecture for Online Product Purchase Example: (4 marks)

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1. Compare both of your designs from perspective of an agile implementation. (4 marks)

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1. An additional service called “Select Self-Pickup Delivery Option” is added to the list of current Online Product Purchase services. Develop user story/stories for this new service called “Select Self-Pickup Delivery Option”. (4 marks)

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| **User Story/User Stories:** |  |

1. Show changes to your microservices architecture resulting from adding this new service. (2 marks)

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1. In order that this new service can be deployed at the end of a two-week sprint, recommend tool chain for continuous development and continuous integration for Online Product Purchase services example. Explain your choice of selection. (4 marks)

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| **Recommended CI/CD DevOps toolchain with explanations and justifications:** |  |

**Question 5 (5 marks)**

1. Use Git as a version control tool for the question 6 and 7. Start a develop branch after you create a new react project. Record the changes made for the exercise 6 and 7. Use Git to output the differences between the initial snapshot (first commit) and the latest snapshot when you finish exercise 7. Insert the screen shots of your steps to complete this question.

*Hint: Use command “git diff”*

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| **Screen Printed Steps and Results:** |  |

**Question 6 (15 marks)**

1. Refer to Lab Exercise 1 and create a home page that displays a NUS logo, a text that says: “NUS is a leading research university in Asia”, and a working navigation panel with Home, Academics, Admission. The academics page should have a list of modules taught at the university and the admission page should have an admission process flow.

The list of modules taught at the university should be formatted as a table:

| Module Code | Module Title |
| --- | --- |
| BT1101 | Introduction to Business Analytics |
| BT2101 | Econometrics Modelling for Business Analytics |
| BT2102 | Data Management and Visualisation |
| BT2103 | Optimization Methods in Business Analytics |

The admission timeline should be formatted as a bullet point list:

1. Understanding Admission requirements
2. Submit application online
3. Upload supporting documents
4. Make application fee payment
5. Check application status

Screenshot the steps you made to complete the task.

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| **Screen Printed Steps and Results:** |  |

**Question 7 (10 marks)**

1. Extend the previous exercise by adding a sign in with Google button to all the pages. Account for the extreme cases, like wrong credentials and non-existent user by triggering a notification message that gives an explanation. Demonstrate that the authentication flow works by signing in with your google account, your account with a wrong password, and an account that does not exists in the database.

*Hint:* *you may reuse some code and firebase settings from the tutorial 2*

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| **Screen Printed Steps and Results:** |  |

**Question 8 (4 marks)**

1. Your e-commerce product team has a regional presence in South-East Asia countries, with usual goods delivery cycle of 5-8 working days. The Product Owner plans to add a new service of self-pickup delivery in one of the countries. One of your squad members estimates that this new feature of self-pickup delivery in this country will require two sprint cycles to complete.
   1. Is trunk-based development more suitable than feature-based development for implementing this new feature? Explain your answer. Further, explain how continuous integration is related to this development. (2 marks)
   2. At the same time with this new feature implementation, a hotfix needs to be developed and applied. Your squad targets to apply this hot fix and the new feature implementation into the next Release cycle in 2 months’ time. Complete the below picture to show these two code developments into Mainline trunk. You may draw the picture separately and paste into the box below. (2 marks)

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| Mainline |

END of Pages for Assignment