OLLSCOIL NA GAILLIMHE

UNIVERSITY OF GALWAY

Autumn1 Examinations, 2022-2023

Course Instance Code	3BCT1
Exam	3rd University Examination in Computer Science
Module Code	CT5106
Module	Software Engineering II
Paper No.	1
External Examiner	Dr. Ramona Trestian
Internal Examiners	Prof. Michael Madden
	Dr. Owen Molloy *
Instructions	Answer any **4** questions. All questions are worth equal marks, which will be scaled to 100% total.
Duration	2hrs
No. of Answer Books	1
Discipline	Computer Science
Requirements	Release in Exam Venue [Yes]
No. of Pages	5

Requirements:

Release in Exam Venue	No[ ]	Yes [☑]
MCQ Answer sheet	No [☑]	Yes [ ]
Handout	No [☑]	Yes [ ]
Formulae & Tables*	No [☑]	Yes []
Cambridge Tables 2nd Edition**	No [☑]	Yes [ ]
Graph Paper*** A4 Graph Paper 1mm 0.1cm Squared (Standard)	No [☑]	Yes [ ]
Other Materials	No [☑]	Yes [ ]
Graphic material in colour	No [☑]	Yes [ ]

1. Answer all parts of this question. Each part is worth [5] marks.

    a. Explain <u>using an example</u> the purpose of the urlPatterns annotation as found in servlets, and how they can be used in servlets to turn them into routers for HTTP requests.

    b. Explain the difference in scope between the request, session and application in JSP / Servlet applications.

    c. Add JPA annotations to the following JavaBean class in order to store product instances in a specific table ("PRODUCT"). Assume the primary key is the *barcode*, and that it is not auto-generated by the database.

```
public class Product implements Serializable
{
private String barcode;
private String name;
private double price;
… // getters and setters can be ignored for this question
}
```

    d. Explain how the Model View Controller architecture can be implemented using servlets and Java Server Pages. Include a brief explanation of what options could be used for the Model layer. You should use a simple diagram to illustrate your answer.

    e. Assuming the following lines of code are executed in a servlet, and that the request is then dispatched to a JSP page, write the JSP code necessary to print out the product's <u>name</u> and <u>price</u> (note any assumptions you make):

```
p1 = new Product();
p1.setBarcode("1101459768");
p1.setName("Widget");
p1.setPrice(12.50);
request.setAttribute ("product", p1);
```

    f. Explain the role of the *service* method in a JSP. Where would each of the following lines be executed and what would be the potential use of doing this?

```
<%! int count = 0; %>

<%= count++ %>
```

    g. Explain of the role of the Entity Manager and the Persistence Unit in using the Java Persistence API (JPA).

    h. Explain, using an example, the use of <context-param> in Java EE applications.

[40 marks]

2. A servlet creates a List of Employee objects, where each Employee object has the properties *name*, *position* and *salary*. The servlet adds this List to the <u>session</u> object and forwards to a JSP page where the list of employees is displayed as a table, using **JSTL** to handle the retrieval of the list of employees from the session, and the display of the list of employee as a table.

  a. Write the JSP code to display the table of employees.

  [20 marks]

  b. Explain, using sample code, your ideas on how you might implement a simple filtering system in the JSP page to display only employees earning above a certain salary.

  [20 marks]

3. Assume you have a Java Bean entity class, called Employee, which has the following properties.

```
private String name;
private String position;
private double salary;
```

You may assume that a Façade session bean class has been created for Employee. A HTML form is used to submit a request to a servlet. The request contains the necessary input parameters to create a new Employee object.

  a. Write the JPA-annotated Employee entity class, specifying the table and columns to be mapped to. The primary key is the *name* attribute. You do not need to write the *getter* and *setter* methods.

  [10 marks]

  b. Write the HTML code for the input form.

  [10 marks]

  c. Write the servlet code necessary to retrieve the request parameters, and use the Façade class to create and persist the new Employee object.
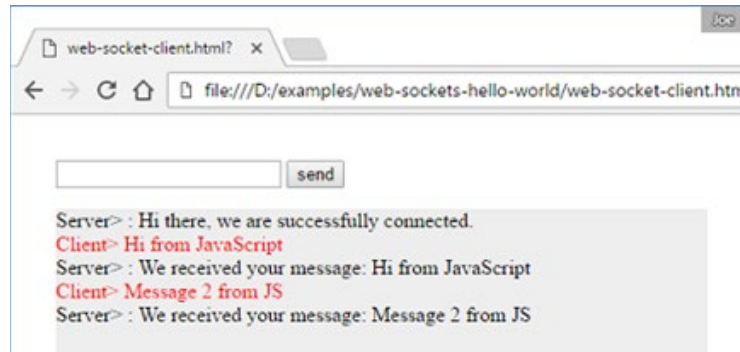
  [20 marks]

4.

a. Explain, using sample code, your understanding of the use of the following in implementing Java Web Sockets:

```
  i.  @ServerEndpoint
 ii.  @OnOpen
iii.  @OnMessage
```

[10 marks]

b. Explain, using as much code as you can, how you would implement a simple Web Socket server which responds to messages from a browser client as illustrated in the following figure:

[15 marks]

c. Write the code needed to implement the Javascript-based web socket client as shown in the figure above.

[15 marks]

5.

a. Explain what is meant by the following in Java Server Faces (JSF):
  i. Execute Phase
  ii. Render Phase
  iii. Managed Bean

[10 marks]

b. In this part of the question you are asked to write the login page, using JSF components to do the following:

- Capture the user id and password, which are mapped to fields in the managed bean.
- On submission of the form to call a method in the managed bean to validate the input user id and password.

[10 marks]
[question continued on next page]

c. Next write the code for a managed bean class which contains the user id and password properties and also the method used to validate the input user id and password.

[10 marks]

d. Demonstrate, using code to illustrate your answer, how the managed bean can use navigation rules (defined in faces-config.xml) to direct the user to different web pages depending on whether the inputs were successfully validated or not.

[10 marks]

Autumn Examinations 2021-2022

Course Instance Code	3BCT1; 1EM1
Exam	3rd University Examination in Computer Science and Information Technology
Module Code	CT5106
Module	Software Engineering II
Paper No.	1
External Examiner	Dr Ramona Trestian
Internal Examiners	Dr. Michael Madden *Dr. Stephen Bradshaw Dr. Karl Mason
Instructions	Each question has a total of 25 marks. Answer any four of five.
Duration	2hrs
Discipline	Computer Science
Course Co-ordinator(s)	Colm O'Riordan
No. of Answer Books	1
Requirements	None
No. of Pages	6

1. Answer all parts below.

    a) Define Software Engineering.

        [3 marks]

    b) Discuss the standard Maven directory set-up. What advantages are there for structuring the directory as they do?

        [3 marks]

    c) Name two items one would expect to find in the POM file.

        [2 marks]

    d) Name any two phases in the Maven Life Cycle.

        [2 marks]

    e) What is the purpose of doPost() and doGet()? Include in your answer some differences between the two methods.

        [3 marks]

    f) Why should a JSP page not contain any business logic?

        [2 marks]

    g) What is the purpose of a *Gantt Chart*?

        [2 marks]

    h) Why is it bad practice to set a variable using JSP Expression Language (el)?

        [2 marks]

    i) Distinguish between the project management styles *Prince* and *Agile*.

        [3 marks]

    j) What type of file format is the *POM* ?

        [2 marks]

    k) What is a *POJO* ?

        [1 mark]

Total: 25 Marks.

[PTO]

2) Answer all parts below.

    (a) What does the next() command return from the ResultSet returned from Hibernate?

                [2 marks]

    (b) What quality characteristics that are relevant to software architecture design should be considered when engaging with designing a system?

                [3 marks]

    (c) In relation to software architecture design, what are non functional requirements? Include two examples in your answer.

                [3 marks]

    (d) Briefly explain how Test Driven Development is done.

                [3 marks]

    (e) In relation to architectural design, what are some system trade-offs that one might make?

                [6 marks]

    (f) Outline some coding principles used in good architecture design.

                [4 marks]

    (g) What is a design constraint and why would one be imposed during the development process of an application?

                [2 marks]

    (h) What is meant by the *Separation of Concerns* in relation to system design?

                [2 marks]

Total: 25 marks

3) Answer all of the following parts.

    (a) Explain what Conway's Law is, and how it may have a bearing on a system during development.

                [2 marks]

    (b) In Software Design what are the pros and cons of utilising *shared resources* when designing a system?

                [4 marks]

    (c) In Layered Architecture explain the difference between open and closed layers. What are the factors that influence the decision of using one over the other ?

                [3 marks]

    (d) What is meant by *the inverted pyramid of use* ?

                [2 marks]

    (e) Outline 3 changes that came when Java 8 was introduced.

                [3 marks]

    (f) Using a real life example discussed in class, outline the experiences of a company implementing or changing a given architecture. What were the challenges/results from using said architecture? *Information looked for might include reference to identification of the issues with the old architecture, the proposed benefits of the new structure. Additionally you might make reference to some of the technologies used.*

                [11 marks]

Total: 25 Marks

4)   Answer all of the following parts.

a)   Describe and contrast two Software Architectural Patterns that we have engaged with in class. Include in your answer the strengths and weaknesses of each, and why one would consider using one over the other in a given situation.

[12 marks]

b)   What is meant by *crosscutting concerns* in relation to system design?

[3 marks]

c)   Why would the application type have a bearing on which architecture is selected for a project?

[4 marks]

d)   What is the difference between Synchronous and Asynchronous Interactions ?

[3 marks]

e)   Why would one consider using the *Façade Pattern* when designing a system?

[3 marks]

Total: 25 Marks

5) Answer all of the following parts.

    a) Typically what coding paradigm is used when Hibernate is used to persist your data ? Why is this the case ?

        [3 marks]

    b) Over-engineering a system can lead to the creation of anti-patterns. Name any two anti-patterns that are associated with Service Orientated Architecture (SOA). Include a brief description of what each is.

        [3 marks]

    c) Name a type of queue that one would find in event-based systems. Include in your answer a brief description of what it is used for.

        [4 marks]

Task	Description	Duration (days)	Predecessors
A	Requirements Analysis	5	
B	System Design	15	A
C	Programming	25	B
D	Telecoms	15	B
E	Hardware installation	30	B
F	Integration	10	C,D
G	System Testing	5	E,F
H	Training/Support	5	G
I	Handover and Deployment	5	H

    d) Taking the critical path as reference, how many days will this project take to complete ?

        [3 marks]

    e) What role do *channels* play in SOA? Include in your answer a reference to how they relate to messages.

        [4 marks]

    f) In SOA what is your understanding of a component?

        [2 marks]

    g) What do we mean when we say a service is language agnostic ?

        [2 mark]

    h) In relation to Service interaction (as found in microservices) distinguish between the issue of being *unavailable* as opposed to *unresponsive*.

        [4 marks]

Total: 25 Marks

[END]

Semester 1 Examinations, 2021/2022

Exam Code	3BCT
Exam	3rd University Examination in Computer Science and Information Technology
Module Code	CT5106
Module	Software Engineering II
Paper No.	1
External Examiner	Dr Ramona Trestian
Internal Examiners	Prof. Michael Madden Dr. Stephen Bradshaw * Dr. Karl Mason
Instructions	Each Question has a total of 25 marks. Answer four of five.
Duration	2hrs
No. of Answer Books	1
Requirements	None
No. of Pages	6

1. Answer all of the questions below

    a) Explain the difference between the following 2 lines of JSP code, and what will happen when they are executed:

```
<%! int numVisits1 = 0; %>

<% int numVisits2 = 0; %>
```

                                                                  [3 marks]

    b) What is the purpose of doPost() and doGet()? Include in your answer some differences between the two methods.

                                                                 [3 marks]

    c) What does it mean to say a Session Bean is Stateful ?

                                                                 [2 marks]

    d) Give two examples of JEE Frameworks.

                                                                  [2 marks]

    e) Explain the purpose of urlPattern annotations as found in servlets, and how they can be used in servlets to turn them into routers for HTTP requests? Is there another way of maintaining servlet addresses?

                                                                  [2 marks]

    f) Explain using a simple diagram, how the Model View Controller architecture can be implemented in a Java Enterprise application ?

                                                                 [3 marks]

    g) What is a servlet?

                                                                   [2 marks]

    h) A servlet is not initialised until it is called. What advantage do you see in that procedure?

                                                                  [2 marks]

    i) What is a *transitive dependency*?

                                                                   [2 marks]

    j) What is *semantic versioning*?

                                                                  [2 marks]

    k) Why would one not set a variable using JSP Expression Language (el)?

                                                                  [2 marks]

PTO

Total: 25 Marks.

2. Answer all of the questions below

   (a) What is the role of an architect in software development?

   [3 marks]

   (b) What is a POM file**?**

   [3 marks]

   (c) What are the quality characteristics of system that are considered when engaging with architectural design?

   [3 marks]

   (d) What is a design constraint and why would an architect chose to include one when designing a system?

   [3 marks]

   (e) Name a design pattern that is associated with a system architecture of your choice. Explain why the pattern aids efficient implementation of said architecture.

   [3 marks]

   (f) Briefly explain how Test Driven Development is done.

   [2 marks]

   (g) In what folder do all Maven generate artifacts get placed?

   [1 mark]

   (h) What is a GAV in relation to Maven ?

   [2 mark]

   (i) Name two phases of a Maven lifecycle.

   [2 marks]

   (j) Name two things that one is likely to find in the POM.

   [2 marks]

   (k) In relation to MVC, what area is JSP associated with ?

   [1 mark]

Total: 25 marks

3. Answer all of the following parts.

(a) Explain what Conway's Law is, and how it may have a bearing on a system during development.

[3 marks]

(b) Define and distinguish between REST and SOAP.

[3 marks]

(c) In Layered Architecture explain the difference between open and closed layers. Why are the factors that influence the decision of using one over the other ?

[3 marks]

(d) What is meant by *the inverted pyramid of reuse* ?

[1 mark]

(e) What is the purpose of a Daily Scrum meeting in Agile, and what questions should scrum team members answer?

[3 marks]

(f) Outline 3 changes that came when Java 8 was introduced ?

[3 marks]

(g) Using a real life example discuss the experiences of a company implementing or changing their architecture. What were the challenges/results from making the change/selecting their architecture?

[9 marks]

Total: 25 Marks

4. Answer all of the following parts.

a) Describe and contrast two Software Architectural Patterns that we have engaged with in class. Include in your answer the strengths and weaknesses of each, and why one would consider using one over the other in a given situation?

[15 marks]

PTO

b) What is Maven and what are the characteristics of it, that would encourage a software engineer to use it in a project?

[6 marks]

c) Name and contrast two project methodologies that we have talked about in class.

[4 marks]

Total: 25 Marks

5. Answer all of the following parts.

a) Given the following table create a diagram of the critical path of the project.

[10 marks]

Task	Description	Duration (days)	Predecessors
A	Requirements Analysis	5	
B	System Design	15	A
C	Programming	25	B
D	Telecoms	15	B
E	Hardware installation	30	B
F	Integration	10	C,D
G	System Testing	10	E,F
H	Training/Support	5	G
I	Handover and Deployment	5	H

b) Taking the critical path as reference, how many days will this project take to complete ?

[3 marks]

c) What is the difference between Synchronous and Asynchronous Interactions ?

[3 marks]

d) In Service Orientated Architecture (SOA) what is a component?

[2 marks]

e) Give a concise definition of SOA.

[2 marks]

f) What do we mean when we say a service is language agnostic ?

[1 mark]

g) Distinguish how SOA is at odds with Object Orientated principles.

[4 marks]

PTO

Total: 25 Marks

Semester 1 Examinations, 2019/2020

Exam Code	3BCT1, 1EM
Exam	3rd University Examination in Computer Science
Module Code	CT5106
Module	Software Engineering II
Paper No.	1
External Examiner	Dr. Jacob Howe
Internal Examiners	Prof. Michael Madden
	Dr. Owen Molloy *
Instructions	You **must answer Question 1** (60 marks) and **any other 2** questions (30 marks each). *(Marks will be adjusted to total 100%.)*
Duration	2hrs
No. of Answer Books	1
Discipline	Computer Science
Requirements	None
No. of Pages	4

1. [60 marks] (you must answer this question) Answers should be concise. Answer all parts. Each part is worth [5] marks.

a. If you were asked to manage a project to develop a new website for a hotel, including an online booking system, list 3 different stakeholders which you might identify, their source of power relative to the project, and how they might be positively or negatively affected by the project.

b. Explain the purpose of the urlPatterns annotation as found in servlets, and how they can be used in servlets to turn them into routers for HTTP requests.

c. Explain the difference in scope between the request, session and application in JSP / Servlet applications.

d. Add JPA annotations to the following Java bean class in order to store product instances in a specific table ("STUDENTS"), and where the id is to be auto-generated by the database.

```
public class Student implements Serializable
{
private int id;
private String firstname;
private String surname;
… // getters and setters can be ignored for this question
}
```

e. What is the purpose of a Daily Scrum meeting in Agile, and what questions should scrum team members answer?

f. What information should a Sprint Backlog contain?

g. If you are using Planning Poker for estimation in an Agile project, what are the steps that the team follow in playing?

h. Explain, using a simple diagram, how the Model View Controller architecture can be implemented in a Java Enterprise application.

i. Assuming the following lines of code are executed in a servlet, and that the request is then dispatched to a JSP page, write the JSP code necessary to print out the user's username and email address:

```
u1 = new User();
u1.username = "JohnS";
u1.email = "john.s@bigmail.com";
request.setAttribute ("user", u1);
```

j. Explain the difference between the following 2 lines of JSP code, and what will happen when they are executed:

```
<%! int numVisits1 = 0; %>

<% int numVisits2 = 0; %>
```

k. Explain the following Project Management terms (as used in Gantt charts):

        a) Critical Path
        b) Lead Time
        c) Task Dependencies

l. Explain briefly how factors such as non-functional requirements, and environmental factors, are taken into account when using estimation techniques such as Function Point Analysis and Use Case Point Analysis.

2. A Java Enterprise application must implement a simple registration function using Servlets and JSP. You must also use a Java Bean data class for the User, and a DAO (Data Access Object using embedded SQL) class to handle persistence of the User class. The User class simply contains the *username* and *password* of the new user.

a) Describe, using a simple diagram, how the Model View Controller architecture is implemented in this application.

[10 marks]

b) Write the HTML code for the Registration.html page. This page would simply contain a form which calls the Registration Servlet. The form is used to input the username and password used to register.

[10 marks]

c) Write the Java code for the servlet. You do not have to write the code for the DAO class – just assume that it is already written, and use appropriate methods which you would expect it to have.

[10 marks]

3. A servlet creates a List of Product objects, where each Product object has the properties *productName*, *description* and *price*. The servlet adds this List to the <u>session</u> object and forwards to a JSP page where the list of products is displayed as a table, using JSTL to handle the retrieval of the list of products from the session, and the iteration over the list of products.

(a) Write the JSP code to display the table of products.

[20 marks]

(b) Explain, using sample code, your ideas on how you might implement a simple filtering system in the JSP page to display only products between a certain price range.

[10 marks]

4. You have been asked to manage a project which involves the design, implementation, test and rollout of a new till system for a large supermarket chain. Answer the following questions in relation to this project.

a) Explain how you would go about performing the Stakeholder Analysis and outline the kinds of information which you would need to capture.

[10 marks]

b) Describe the most important stakeholders in the project, and what specific issues might arise or need to be handled with respect to them.

[10 marks]

c) What would you expect to be contained in the Communications Management Plan for the project?

[10 marks]

5. As part of a new project to develop a new web app for an online betting shop, you are asked to set up the Agile planning process. So far, you have received the Product Backlog from the customer

a) Explain how you would do an initial estimate, of the story points needed for each item in the Product Backlog, using Planning Poker with your Agile team.

[10 marks]

b) Describe how you would create a Release Plan for the project sprints, based on initial velocity estimates, and how you would adjust your estimates and sprint planning as the project progresses.

[10 marks]

c) Sketch and explain examples of the two main types of burndown charts which you would use to track progress in the project and its sprints. Explain how they can be used to highlight problems with both under-estimation and over-estimation.

[10 marks]

6. As part of a new project to develop a JEE online shop application, you are asked to manage the estimation of the development cost. So far, the requirements have been described using detailed Use Case diagrams and descriptions.

a) Explain the steps involved if you were to perform an estimation of the project duration (development hours) using the Use Case points methodology

[21 marks]

b) Provide 2 examples of each of the following as used in estimation by Use Case Points:

- Actor Weight **[3 marks]**

- Technical Complexity Factor **[3 marks]**

- Environmental Complexity Factor **[3 marks]**

Autumn Examinations, 2018/2019

Exam Code	3BCT1
Exam	3rd University Examination in Computer Science and Information Technology
Module Code	CT5106
Module	Software Engineering II
Paper No.	1
External Examiner	Dr. Jacob Howe
Internal Examiners	Dr. Michael Madden
	Dr. Owen Molloy *
Instructions	You must answer **<u>any</u> 3** questions. Each question is worth the same number of marks. *(Marks will be adjusted to total 100%.)*
Duration	2hrs
No. of Answer Books	1
Requirements	None
No. of Pages	4

1. Answer all 8 parts of this question. Answers should be concise. Each part is worth **5** marks.

    a) Explain briefly your understanding of the Model-View-Controller architectural pattern.

    b) Explain the purpose of the urlPatterns annotation as found in servlets, for example:

      @WebServlet (name = "dataServlet", urlPatterns = {"/dataServlet"})

    c) Explain the difference between request scope, session scope and application scope in JEE applications.

    d) Add the JPA annotations @Entity, @Table, @Column, @Id to the following Java bean class:

```
public class Supplier
{
    private int id;
    private String name;
    private String description;
}
```

    e) Please provide the 3 lines of code that you would include in a JSP page that would declare a variable (integer i), and then increment and print it out every time the JSP page was called.

    f) Explain the following Project Management terms (as used in Gantt charts):
      i) Critical Path
      ii) Lead Time
      iii) Task Dependencies

    g) What is the purpose of a Daily Scrum meeting in Agile, and what questions should scrum team members answer?

    h) List briefly what you see as the main differences between a group-based estimation method, such as Planning Poker, and size-based estimation, such as Use Case Analysis.

2. Assume you have a Java Bean entity class, called Person, which has the following properties.

    private String id;
    private String lastname;
    private String firstname;

You may assume that a Façade session bean class has been created for Person. A HTML form is used to submit a request to a servlet. The request contains the necessary input parameters to create a new Person object.

a) Write the JPA-annotated Person entity class. The primary key is the id attribute. You do not need to write the *getter* and *setter* methods. The Person object data will be stored in a table with a different name (Employee).

[10 marks]

b) Write the HTML code for the input form.

[10 marks]

c) Write the servlet code necessary to retrieve the request parameters, and use the Façade class to create and persist the new Person object.

[20 marks]

3. You have been asked to manage a project which involves the design, implementation, test and rollout of a new online hotel booking system. Answer the following questions in relation to this project.

a) Explain how you would go about performing the Stakeholder Analysis and outline the kinds of information which you would need to capture.

[20 marks]

b) Describe the most important stakeholders in the project, and what specific issues might arise or need to be handled with respect to them.

[10 marks]

c) What would you expect to be contained in the Communications Management Plan for the project?

[10 marks]

4. As part of a new project to develop a JEE online booking application for a community hall, you are asked to manage the estimation of the development cost. So far, the requirements have been described using detailed Use Case diagrams and descriptions.

a) Explain the steps involved if you were to perform an estimation of the project duration (development hours) using the Use Case points methodology

[25 marks]

b) Provide 2 examples of each of the following as used in estimation by Use Case Points:

- Actor Weight

[5 marks]

- Technical Complexity Factor

[5 marks]

- Environmental Complexity Factor

[5 marks]

5. As part of a project to develop a new mobile phone app, you are asked to set up the Agile planning process. So far, you have received the Product Backlog from the customer

a) Explain how you would do an initial estimate, of the story points needed for each item in the Product Backlog, using Planning Poker with your agile team.
[15 marks]

b) Describe how you would create a Release Plan for the project sprints, based on initial velocity estimates, and how you would adjust your estimates and sprint planning as the project progresses.
[15 marks]

c) Sketch and explain examples of the two main types of burndown charts which you would use to track progress in the project and its sprints. Explain how they can be used to highlight problems with under-estimation or over-estimation.
[10 marks]

Semester 1 Examinations, 2018/2019

Exam Code	3BCT1, 1EM
Exam	3rd University Examination in Computer Science and Information Technology
Module Code	CT5106
Module	Software Engineering II
Paper No.	1
External Examiner **Internal Examiners**	Dr. Jacob Howe Dr. Michael Madden Dr. Owen Molloy *
Instructions	You must answer **<u>any</u> 3** questions. Each question is worth the same number of marks. *(Marks will be adjusted to total 100%.)*
Duration	2hrs
No. of Answer Books	1
Requirements	None
No. of Pages	3

1. Answer all 8 parts of this question. Answers should be concise. Each part is worth **5** marks.

a) Explain briefly your understanding of the Model-View-Controller architectural pattern.

b) Explain the purpose of the urlPatterns annotation as found in servlets, for example:

@WebServlet (name = "dataServlet", urlPatterns = {"/dataServlet"})

c) Explain the difference between request scope, session scope and application scope in JEE applications.

d) Add the JPA annotations @Entity, @Table, @Column, @Id to the following Java Bean class:

```
public class Supplier
{
    private int id;
    private String name;
    private String description;
}
```

e) Please provide the 3 lines of code that you would include in a JSP page that would declare a variable (integer i), and then increment and print it out every time the JSP page was called.

f) Explain the following Project Management terms (as used in Gantt charts):
   i) Critical Path
   ii) Lead Time
   iii) Task Dependencies

g) What is the purpose of a Daily Scrum meeting in Agile, and what questions should scrum team members answer?

h) List briefly what you see as the main differences between a group-based estimation method, such as Planning Poker, and size-based estimation, such as Use Case Analysis.

2. Assume you have a Java Bean entity class, called Book, which has the following properties.

    private String ISBN;
    private String author;
    private String title;
    private double price;

You may assume that a Façade session bean class has been created for Book. A HTML form is used to submit a request to a servlet. The request contains the necessary input parameters to create a new Book object.

a) Write the JPA-annotated Book entity class. The primary key is the ISBN. You do not need to write the *getter* and *setter* methods. The Book object data will be stored in a table with a different name (Publication).

[10 marks]

b) Write the HTML code for the input form.

[10 marks]

c) Write the servlet code necessary to retrieve the request parameters, and use the Façade class to create and persist the new Book object.

[20 marks]

3. You have been asked to manage a project which involves the design, implementation, test and rollout of a new website and booking system for a theatre. Answer the following questions in relation to this project.

a) Explain how you would go about performing the Stakeholder Analysis and outline the kinds of information which you would need to capture.

[20 marks]

b) Describe the most important stakeholders in the project, and what specific issues might arise or need to be handled with respect to them.

[10 marks]

c) What would you expect to be contained in the Communications Management Plan for the project?

[10 marks]

4. As part of a new project to develop a JEE online shop application, you are asked to manage the estimation of the development cost. So far, the requirements have been described using detailed Use Case diagrams and descriptions.

a) Explain the steps involved if you were to perform an estimation of the project duration (development hours) using the Use Case points methodology

[25 marks]

b) Provide 2 examples of each of the following as used in estimation by Use Case Points:

- Actor Weight

[5 marks]

- Technical Complexity Factor

[5 marks]

- Environmental Complexity Factor

[5 marks]

5. As part of a project to develop a new mobile phone app, you are asked to set up the Agile planning process. So far, you have received the Product Backlog from the customer

a) Explain how you would do an initial estimate of the story points needed for each item in the Product Backlog, using Planning Poker with your Agile team.

[15 marks]

b) Describe how you would create a Release Plan for the project sprints, based on initial velocity estimates, and how you would adjust your estimates and sprint planning as the project progresses.

[15 marks]

c) Sketch and explain examples of the two main types of burndown charts which you would use to track progress in the project and its sprints. Explain how they can be used to highlight problems with under-estimation or over-estimation.

[10 marks]

Semester 1 Examinations, 2017/2018

Exam Code	3BCT1, 1EM
Exam	3rd University Examination in Computer Science and Information Technology
Module Code	CT5106
Module	Software Engineering II
Paper No.	1
External Examiner	Dr. Jacob Howe
Internal Examiners	Dr. Michael Schukat
	Dr. Owen Molloy *
Instructions	You must answer **any 3** questions (each question is marked equally). *(Marks will be adjusted to total 100%.)*
Duration	2hrs
No. of Answer Books	1
Requirements	None
No. of Pages	4

1. A Java Enterprise application must implement a simple Registration function using Servlets and JSP. You must also use a Java Bean data class for the User, and a DAO (Data Access Object using embedded SQL) class to handle persistence of the User class. The User class simply contains the *username* and *password* of the new user.

a) Describe, using a simple diagram, how the Model View Controller architecture is implemented in this application.

[10 marks]

b) Write the HTML code for the Registration.html page. This page would simply contain a form which calls the Registration Servlet. The form is used to input the username and password used to register.

[10 marks]

c) Write the Java code for the servlet. You do not have to write the code for the DAO class – just assume that it is already written, and use appropriate methods which you would expect it to have.

[13 marks]

2. A servlet creates a List of Module objects, where each subject object has the properties *moduleCode*, *moduleName* and *moduleDescription*. For example:

moduleCode = "CT2104"
moduleName = "Web Application Development"
moduleDescription = "Web Development Using Java Server technology"

The servlet adds this List to the <u>session</u> object and forwards to a JSP page where the list of modules is displayed as a table, using JSTL to handle the retrieval of the list of modules from the session, and the iteration over the list of modules.

(a) Explain the difference between request scope, session scope and application scope in JEE applications.

[5 marks]

(b) Explain, using an example, how you would use Expression Language in a JSP page to retrieve data from a session.

[10 marks]

(c) Write the JSP page code.

[18 marks]

3. Assume you have a Java Bean entity class, called Product, which has the following properties.

```
private String productCode;
private String productName;
private String productDescription;
private double price;
```

You may assume that a Façade session bean class has been created for Product. A HTML form is submitted to a servlet. The form contains the necessary input parameters to create a new Product object.

a) Write the JPA-annotated Product entity class. The primary key is the product code. You do not need to write the *getter* and *setter* methods. The Product object data will be stored in a table with a different name ("Stock").

[15 marks]

b) Write the servlet code necessary to retrieve the request parameters. Use the Façade class to create and persist the new Product object.

[18 marks]

4. You have been asked to manage a project which involves the design, implementation, test and rollout of a new online booking system for a small theatre. Answer the following questions in relation to this project.

a) Explain how you would go about performing the Stakeholder Analysis and outline the kinds of information which you would need to capture.

[15 marks]

b) Describe the most important stakeholders in the project, and what specific issues might arise or need to be handled with respect to them.

[8 marks]

c) What would you expect to be contained in the Communications Management Plan for the project?

[10 marks]

5. As part of a new project to develop a JEE online shop application, you are asked to manage the estimation of the development cost. So far, the requirements have been described using detailed Use Case diagrams and descriptions.

a) Explain the steps involved if you were to perform an estimation of the project duration (development hours) using the Use Case points methodology

[15 marks]

b) Provide 2 examples of each of the following as used in estimation by Use Case Points:

- Actor Weight

[6 marks]

- Technical Complexity Factor

[6 marks]

- Environmental Complexity Factor

[6 marks]

6. As part of a new project to develop a new mobile phone app, you are asked to set up the Agile planning process. So far, you have received the Product Backlog from the customer

a) Explain how you would do an initial estimate, of the story points needed for each item in the Product Backlog, using Planning Poker with your agile team.

[10 marks]

b) Describe how you would create a Release Plan for the project sprints, based on initial velocity estimates, and how you would adjust your estimates and sprint planning as the project progresses.

[12 marks]

c) Sketch and explain examples of the two main types of burndown charts which you would use to track progress in the project and its sprints. Explain how they can be used to highlight problems with under-estimation or over-estimation.

[11 marks]

Semester 1 Examinations, 2017/2018

Exam Code	3BCT1, 1EM
Exam	3rd University Examination in Computer Science and Information Technology
Module Code	CT5106
Module	Software Engineering II
Paper No.	1
External Examiner	Dr. Jacob Howe
Internal Examiners	Dr. Michael Schukat
	Dr. Owen Molloy *
Instructions	You must answer **any 3** questions (each question is marked equally). *(Marks will be adjusted to total 100%.)*
Duration	2hrs
No. of Answer Books	1
Requirements	None
No. of Pages	3

1. A Java Enterprise application must implement a simple Registration function using Servlets and JSP. You must also use a Java Bean data class for the User, and a DAO (Data Access Object using embedded SQL) class to handle persistence of the User class. The User class simply contains the *username* and *password* of the new user.

a) Describe, using a simple diagram, how the Model View Controller architecture is implemented in this application.

[10 marks]

b) Write the HTML code for the Registration.html page. This page would simply contain a form which calls the Registration Servlet. The form is used to input the username and password used to register.

[10 marks]

c) Write the Java code for the servlet. You do not have to write the code for the DAO class – just assume that it is already written, and use appropriate methods which you would expect it to have.

[13 marks]

2. A servlet creates a List of Product objects, where each user object has the properties *productName*, *description* and *price*. The servlet adds this List to the <u>session</u> object and forwards to a JSP page where the list of products is displayed as a table, using JSTL to handle the retrieval of the list of products from the session, and the iteration over the list of products.

(a) Explain the difference between request scope, session scope and application scope in JEE applications.

[5 marks]

(b) Explain, using an example, how you would use Expression Language in a JSP page to retrieve data from a session.

[10 marks]

(c) Write the JSP page code.

[18 marks]

3. Assume you have a Java Bean entity class, called Car, which has the following properties.

    private String registration;
    private String make;
    private String model;
    private int mileage;
    private double price;

You may assume that a Façade session bean class has been created for Car. A HTML form is submitted to a servlet. The form contains the necessary input parameters to create a new Car object.

a) Write the JPA-annotated Car entity class. The primary key is the vehicle registration. You do not need to write the *getter* and *setter* methods. The Car object data will be stored in a table with a different name (Vehicle).

[15 marks]

b) Write the servlet code necessary to retrieve the request parameters. Use the Façade class to create and persist the new Car object.

[18 marks]

4. You have been asked to manage a project which involves the design, implementation, test and rollout of a new till system for a large supermarket chain. Answer the following questions in relation to this project.

a) Explain how you would go about performing the Stakeholder Analysis and outline the kinds of information which you would need to capture.

[15 marks]

b) Describe the most important stakeholders in the project, and what specific issues might arise or need to be handled with respect to them.

[8 marks]

c) What would you expect to be contained in the Communications Management Plan for the project?

[10 marks]

5. As part of a new project to develop a JEE online shop application, you are asked to manage the estimation of the development cost. So far, the requirements have been described using detailed Use Case diagrams and descriptions.

a) Explain the steps involved if you were to perform an estimation of the project duration (development hours) using the Use Case points methodology

[15 marks]

b) Provide 2 examples of each of the following as used in estimation by Use Case Points:

- Actor Weight

[6 marks]

- Technical Complexity Factor

[6 marks]

- Environmental Complexity Factor

[6 marks]

6. As part of a new project to develop a new mobile phone app, you are asked to set up the Agile planning process. So far, you have received the Product Backlog from the customer

a) Explain how you would do an initial estimate, of the story points needed for each item in the Product Backlog, using Planning Poker with your agile team.

[10 marks]

b) Describe how you would create a Release Plan for the project sprints, based on initial velocity estimates, and how you would adjust your estimates and sprint planning as the project progresses.

[12 marks]

c) Sketch and explain examples of the two main types of burndown charts which you would use to track progress in the project and its sprints. Explain how they can be used to highlight problems with under-estimation or over-estimation.

[11 marks]

Autumn Examinations, 2016/2017

Exam Code	3BCT1
Exam	3rd University Examination in Computer Science and Information Technology
Module Code	CT5106
Module	Software Engineering II
Paper No.	1
External Examiner	Dr. John Power
Internal Examiners	Prof. Peter McHugh
	Dr. Michael Schukat
	Dr. Owen Molloy*
Instructions	You must answer **Question 1** (50 marks) **and any other 2 questions** (25 marks each).
Duration	2hrs
No. of Answer Books	1
Requirements	None
No. of Pages	5

1. *Compulsory (you must answer this question)* Answers should be concise. Answer all parts. Each part is worth [**5**] marks.

1.1. Please provide the 3 lines of code that you would include in a JSP page that would declare a variable (integer i), and then increment and print it out every time the JSP page was called.

1.2. Explain the difference between *request scope*, *session scope* and *application scope* in JEE applications.

1.3. What information should a "Product Backlog" contain?

1.4. Explain the purpose of the urlPatterns annotation as found in servlets, for example:

@WebServlet(name = "dataServlet", urlPatterns = {"/dataServlet"})

1.5. Explain the meaning of the following terms in Ant build files:

a) "target"

b) "attribute"

c) "depends"

1.6. If you are using Planning Poker for estimation in an Agile project, what are the steps that the team should follow in playing?

1.7. Assuming the following lines of code are executed in a servlet, and that the request is then forwarded to a JSP page, write the JSP code necessary to print out the product's name and price:

```
p1 = new Product();
p1.name = "Widget";
p1.price = 45.00;
```

```
session.setAttribute ("product", p1);
```

1.8.   Explain the difference between the following 2 lines of JSP code, and what will happen when they are executed:

```
<%! int count_1 = 0; %>
<% int count_2 = 0; %>
```

1.9.   Explain the following Project Management terms (as used in Gannt charts):

a)   *Critical Path*

b)   *Lead Time*

c)   *Task Dependencies*

1.10.   Add the JPA annotations @Entity, @Table, @Column, @Id to the following Java bean class:

```
public class User implements Serializable
{
private int id;
private String name;
}
```

2. Assume you have a Java Bean class, called Book, which has the following properties (you can assume the getters and setters are also already written):

```
private String title;
private String author;
private double price;
private int ID;
```

Assume also that you are given initial code for a servlet, as show below:

```
protected    void    processRequest(HttpServletRequest    request,
HttpServletResponse response)
            throws ServletException, IOException {

Book b1 = new Book ("C++", "J. Smith", 50.00, 101);
Book b2 = new Book ("Java", "S. Jones", 45.00, 102);
Book b3 = new Book ("C#", "B. Moore", 39.95, 103);
Book b4 = new Book ("HTML5", "D. Webb", 25.00, 104);
```

(a) Finish the java code for the servlet. The servlet code must be finished so that it adds the books to a List object. The List object must be added to the **session** as an attribute, and control forwarded to a JSP page.

[15 marks]

(b) Write the JSP page code, where the books must be displayed as a table.

[10 marks]

3. A servlet creates a list of User objects, where each user object has the properties firstName, surname, age and gender. The servlet adds this list to the session object and forwards to a JSP page where the list of users is displayed as a table.

(a) Write the Java code for the servlet.

[15 marks]

(b) Write the JSP page code.

[10 marks]

4. Assume you have a Java Bean entity class, called Car, which has the following properties.

private String registration;
private String make;
private String model;
private int mileage;
private double price;

You may also assume that the class is persistable and annotated correctly using JPA, and that a Façade session bean class has been created for Car.

A HTML form is submitted to a servlet. The form contains the necessary input parameters to create a new Car object.

Write the servlet code necessary to retrieve the request parameters and use the Façade class to create and persist the new Car object.

[25 marks]

Semester 1 Examinations, 2016/2017

Exam Code	3BCT1, 1EM
Exam	3rd University Examination in Computer Science and Information Technology
Module Code	CT5106
Module	Software Engineering II
Paper No.	1
External Examiner	Dr. John Power
Internal Examiners	Dr. Jim Duggan
	Dr. Michael Madden
	Dr. Owen Molloy *
Instructions	You must answer **Question 1** (40 marks) and any other 2 questions (30 marks each).
Duration	2hrs
No. of Answer Books	1
Requirements	None
No. of Pages	3

1. You must answer this question. Answer all 8 parts of this question. Answers should be concise. Each part is worth **5** marks. **This question is worth 40 marks in total.**

    a) Explain briefly your understanding of the Model-View-Controller architectural pattern.

    b) Explain the purpose of the urlPatterns annotation as found in servlets, for example:

        @WebServlet (name = "dataServlet", urlPatterns = {"/dataServlet"})

    c) Explain the difference between request scope, session scope and application scope in JEE applications.

    d) Add the JPA annotations @Entity, @Table, @Column, @Id to the following Java bean class:

```
public class Supplier
{
    private int id;
    private String name;
    private String description;
}
```

    e) Please provide the 3 lines of code that you would include in a JSP page that would declare a variable (integer i), and then increment and print it out every time the JSP page was called.

    f) Explain the following Project Management terms (as used in Gantt charts):
      i) Critical Path
      ii) Lead Time
      iii) Task Dependencies

    g) Explain the meaning of the following terms in Ant build files:
      i) target
      ii) destfile
      iii) srcdir

    h) List briefly what you see as the main differences between a group-based estimation method, such as Planning Poker, and size-based estimation, such as Use Case Analysis.

2. A JSP/servlet application must implement a simple Registration.html page in HTML, which contains a form where the user enters their username and password. The form is submitted to the doPost method of a servlet which must retrieve the form parameters. The servlet uses a Data Access Object class to first check if the user name already exists. If the user already exists, then a message is added to the request and it is forwarded to a RegistrationFailed.jsp page where the message is printed out. If the user doesn't already exist, the DAO is used to create the user, and then the servlet forwards to the Login.jsp page.

    (a) Write the HTML code for the Registration.html page.

                                                       [15 marks]

    (b) Write the Java code for the servlet. You do not have to write the code for the DAO class – just assume that it is already written, and use appropriate methods you would expect it to have.

                                                       [15 marks]

3. A servlet creates a list of User objects, where each user object has the properties firstName, surname, age and gender. The servlet adds this list to the session object and forwards to a JSP page where the list of users is displayed as a table.

    (a) Write the Java code for the servlet.

[15 marks]

    (b) Write the JSP page code.

[15 marks]

4. Assume you have a Java Bean entity class, called Car, which has the following properties. You may also assume that the class is persistable and annotated correctly using JPA, and that a Façade session bean class has been created for Product.

private String registration;
private String make;
private String model;
private int mileage;
private double price;

A HTML form is submitted to a servlet. The form contains the necessary input parameters to create a new Car object. Write the servlet code necessary to retrieve the request parameters and use the Façade class to create and persist the new Car object.

[30 marks]

Semester 1 Examinations, 2015/2016

Exam Code	3BCT1
Exam	3rd University Examination in Computer Science and Information Technology
Module Code	CT5106
Module	Software Engineering 2
Paper No.	1
External Examiner	Dr. John Power
Internal Examiners	Prof. Gerard. Lyons
	Dr. Michael Madden
	Dr. Owen Molloy*
Instructions	You must answer **Question 1** (60 marks) **and any other 2 questions** (20 marks each).
Duration	2hrs
No. of Answer Books	1
Requirements	None
No. of Pages	5

1) *[60 marks]* *(you must answer this question)* Answers should be concise. Answer all parts. Each part is worth [**3**] marks.

1.1. Explain the difference between *functional* and *non-functional* requirements.

1.2. Give examples of the *<<uses>>* and *<<extends>>* stereotypes in UML.

1.3. If you were asked to draw a use case diagram for a hotel website, including an online booking system, list 6 different actors which you might identify.

1.4. Explain the purpose of the urlPatterns annotation as found in servlets, for example:

@WebServlet(name = "dataServlet", urlPatterns = {"/dataServlet"})

1.5. Explain the difference in scope between the *request*, *session* and *application* in JSP / Servlet applications.

1.6. Add the JPA annotations @Entity, @Table, @Column, @Id to the following Java bean class:

```
public class Product implements Serializable
{
private int id;
private String name;
}
```

1.7. What is the purpose of a Daily Scrum meeting in Agile, and what questions should scrum team members answer?

1.8. What information should a *Sprint Backlog* contain?

1.9. If you are using Planning Poker for estimation in an Agile project, what are the steps that the team follow in playing?

1.10. Describe briefly 3 methods of *requirements elicitation*.

1.11. Draw a simple class diagram to illustrate *Association* and *Generalisation* relationships.

1.12. Use examples to explain the difference between *composition* and *aggregation* relationships between classes.

1.13. Explain, using a simple diagram, how the Model View Controller architecture is implemented in a Java Enterprise application, such as the one you implemented in your group project.

1.14. Explain the meaning of the following terms used in JUnit:

 a) *@Test*

 b) *@BeforeClass*

 c) *Assert*

1.15. What is the difference between *nice* mocking and *strict* mocking, when using a mocking framework such as EasyMock?

1.16. Assuming the following lines of code are executed in a servlet, and that the request is then dispatched to a JSP page, write the JSP code necessary to print out the users username and email address:

```
u1 = new User();
u1.username = "JohnS";
u1.email = "john.s@bigmail.com";
request.setAttribute ("user", u1);
```

1.17. Explain the difference between the following 2 lines of JSP code, and what will happen when they are executed:

```
<%! int numVisits1 = 0; %>
<% int numVisits2 = 0; %>
```

1.18. Explain the meaning of the following terms in Ant build files:

 a) *target*

 b) *destfile*

 c) *srcdir*

1.19. Explain the following Project Management terms (as used in Gannt charts):

 a) *Critical Path*

 b) *Lead Time*

 c) *Task Dependencies*

1.20. Explain briefly how factors such as non-functional requirements, and environmental factors, are taken into account when using estimation techniques such as Function Point Analysis and Use Case Point Analysis.

2) *[20 marks]* Construct a Class Diagram for the order processing system described below.

- Each order consists of one or more order lines.
- Each order line corresponds to a particular product. Each order line has a product description, price, quantity and a field that indicates the status of this order line.
- A product can appear on many orders.
- The status of an order line can be either *filled* (sufficient quantities of the item are in stock), *on-order* (extra stock must be ordered to fulfill the order) or *cancelled*.
- The status of an order can be *pending* (initial state, while stock levels are being checked), *filled* (the order has been packaged ready for shipping), *shipped* (received by the customer but not paid), *closed* (the customer has received the goods and paid the amount due), or *cancelled*.
- A customer can place many orders, but each order belongs to only one customer.
- Each order has an order number, date and customer number.
- Customers can be either businesses or individuals.
- All customers have a name and address. Business customers also have a contact name, credit rating and available credit.
- Individual customers may have a credit card number on file.

3) *[20 marks]* You have been asked to develop an online shopping application, using Java Beans, Servlets, Java Server Pages and Session Beans as Facades between the entity classes and the persistence layer.
   a) *[10 marks]* Draw a diagram to illustrate the architecture of the system, and explain the role of the different layers and how they interact with each other.
   b) *[10 marks]* Explain, using a UML sequence diagram, the sequence of object interactions necessary to fulfil use cases such as adding a product item to a shopping cart. Annotate your diagram with notes as needed.

.

4) *[20 marks]* Assume you have a Java Bean class, called Product, which has the following properties (you can assume the getters and setters are also already written):

```
private String name;
private String description;
private double price;
private int ID;
```

Assume also that you are given initial code for a servlet, as show below:

```
protected   void   processRequest(HttpServletRequest   request,
HttpServletResponse response)
            throws ServletException, IOException {

Product p1 = new Product("Whiteboard", "Just a white board",
50.00, 101);
Product p2 = new Product("Stapler", "Just a staple stapler",
10.00, 102);
Product p3 = new Product("Chair", "Standard office chair",
40.00, 103);
Product p4 = new Product("Lamp", "Anglepoise!", 25.00, 104);
```

(a) *[8 marks]* Finish the java code for the servlet. The servlet code must be finished so that it adds the products to a List object. The List object must be added to the session as an attribute, and control forwarded to a JSP page.

(b) *[12 marks]* Write the JSP page code, where the products will be displayed as shown (you may ignore styling).

Product Catalogue

Code	Name	Description	Price
101	Whiteboard	Just a white board	50.0
102	Stapler	Just a staple stapler	10.0
103	Chair	Standard office chair	40.0
104	Lamp	Anglepoise!	25.0