SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2024-2025 (EVEN)

SET - B

ANSWER KEY

Test: FJ1 — **Date: 19.02.2025**
Course Code & Title:21CSC303J - Software Engineering and Project Management — **Duration: 100 minutes**
Year & Sem: III & VI — **Max. Marks:** 50

Course Articulation Matrix:

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	--	--	--	--	--	--	--	--	2	--	2	--
CO2	--	3	--	--	--	--	--	--	2	--	2	--

Note: CO1 : Identify the process of project life cycle model and process.
CO2 : Analyze and translate end-user requirements into system and software requirements.

Part – A (10 × 1 = 10 Marks)
Instructions: Answer all
The duration for answering part A is **15 minutes** (this sheet will be collected after 15 minutes).

Q. No	Question	Marks	BL	CO	PO	PI Code
1	The following model is not suitable for accommodating any change A. Prototyping B. Spiral C. Incremental D. Waterfall **Answer: D**	1	1	1	1	1.6.1
2	Which of the following activities is not time boxed? A. Sprint Retrospective B. Sprint C. Product Backlog Refinement D. Daily Scrum **Answer: C**	1	1	1	1	1.6.1
3	If a new requirement emerges once an Agile project is running, it should be: A. Automatically included in the work of the project B. Automatically excluded and left until a later project C. Put onto a list for consideration by the wider group of stakeholders after the project has been completed D. Assessed for importance and, if important to the business, included in the project, displacing less important requirements **Answer: D**	1	1	1	1	1.6.1
4	Once a project is underway, the approach to planning is: A. Plans should never be changed	1	1	1	1	1.6.1

	B. Plans should only be changed with full approval of all stakeholders C. Plans are not required D. It is normal to plan and replan as the project progresses **Answer: D**					
5	Enhancements, upgrades, and bug fixes are done during the ____________ step in the SDLC. A. Maintenance and Evaluation B. Problem/Opportunity Identification C. Design D. Development and Documentation **Answer: A**	1	2	1	1	1.6.1
6	Identify one of the following is not a step of requirement engineering? A. Elicitation B. Design C. Analysis D. Documentation **Answer: B**	1	3	2	1	1.6.1
7	Consider a smart home system where a heat sensor detects an intrusion and alerts the security company. Which type of requirements does the system provide? A. Functional B. Non-Functional C. Known Requirement D. Software requirement **Answer: A**	1	2	2	1	1.6.1
8	System requirements are generally written for: A. End-users B. Developers and testers C. Marketing teams D. Legal departments **Answer: B**	1	2	2	2	1.7.1
9	Which of the following is NOT typically found in a Software Requirements Specification (SRS) document? A. Detailed user interface design B. Functional requirements C. Non-functional requirements D. System-constraints **Answer: A**	1	1	2	1	1.7.1
10	Which of the following is an example of a functional requirement? A. The system shall be available 99.9% of the time. B. The system shall allow users to log in with a username and password. C. The system shall respond to user inputs within 2 seconds. D. The system shall comply with GDPR regulations. **Answer: B**	1	2	2	1	1.2.2

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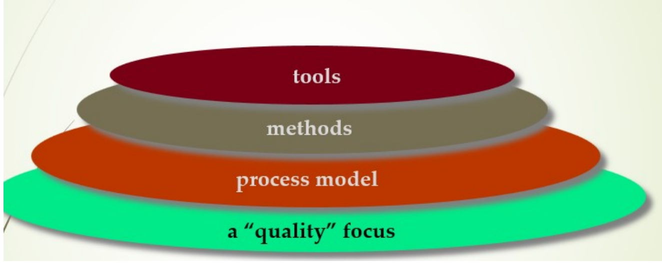
CO1	--	--	--	--	--	--	--	--	2	--	2	--
CO2	--	3	--	--	--	--	--	--	2	--	2	--

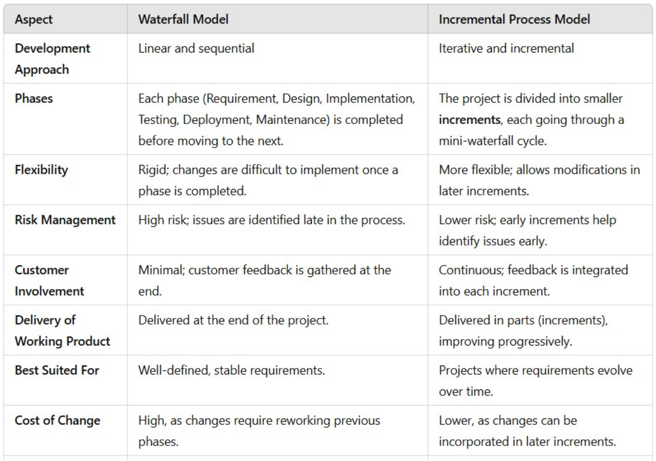
Note: CO1 : Identify the process of project life cycle model and process.
CO2 : Analyze and translate end-user requirements into system and software requirements.

Part – B (4 × 5 = 20 Marks)
Instructions: Answer any Four questions.

11	Imagine you are tasked with developing a complex software system for a large-scale project. To ensure the system is scalable, maintainable, and well-organized, you decide to apply the software engineering layered technology approach. Explain how you would structure the software development process using this layered technology and provide a diagram to illustrate how each layer interacts with the others in the system's architecture. **Ans:**  - Software engineering is a layered technology. - The foundation for software engineering is the *process layer* - **Process** defines a framework that must be established for effective delivery of software - Software engineering *methods provide technical how-to's for building software.*	5	2	1	1	1.6.1
12	You are managing a software development project for a client. Compare and contrast the Waterfall model	5	2	1	1	1.6.1

<table>
<tr><th></th><th></th><th></th><th></th><th></th><th></th><th></th></tr>
<tr><td></td><td>and the Incremental process model in terms of flexibility, handling changes, and project risk. Which model would you recommend for this project?

<b>Ans:</b>

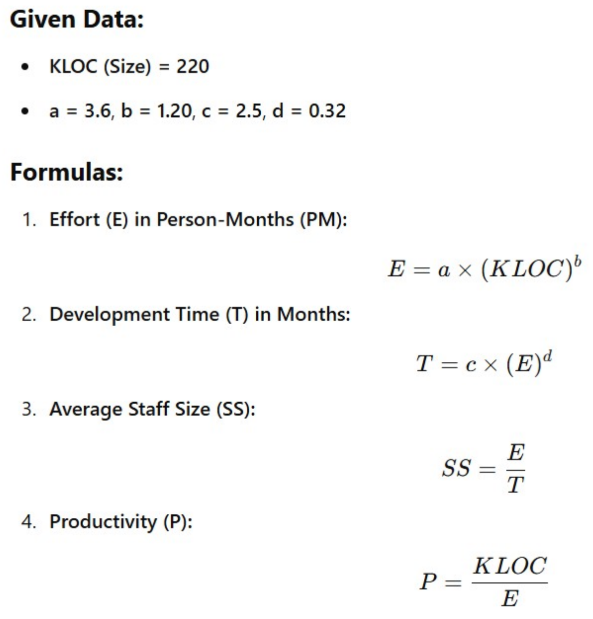

<table>
<tr><th>Aspect</th><th>Waterfall Model</th><th>Incremental Process Model</th></tr>
<tr><td><b>Development Approach</b></td><td>Linear and sequential</td><td>Iterative and incremental</td></tr>
<tr><td><b>Phases</b></td><td>Each phase (Requirement, Design, Implementation, Testing, Deployment, Maintenance) is completed before moving to the next.</td><td>The project is divided into smaller <b>increments</b>, each going through a mini-waterfall cycle.</td></tr>
<tr><td><b>Flexibility</b></td><td>Rigid; changes are difficult to implement once a phase is completed.</td><td>More flexible; allows modifications in later increments.</td></tr>
<tr><td><b>Risk Management</b></td><td>High risk; issues are identified late in the process.</td><td>Lower risk; early increments help identify issues early.</td></tr>
<tr><td><b>Customer Involvement</b></td><td>Minimal; customer feedback is gathered at the end.</td><td>Continuous; feedback is integrated into each increment.</td></tr>
<tr><td><b>Delivery of Working Product</b></td><td>Delivered at the end of the project.</td><td>Delivered in parts (increments), improving progressively.</td></tr>
<tr><td><b>Best Suited For</b></td><td>Well-defined, stable requirements.</td><td>Projects where requirements evolve over time.</td></tr>
<tr><td><b>Cost of Change</b></td><td>High, as changes require reworking previous phases.</td><td>Lower, as changes can be incorporated in later increments.</td></tr>
</table></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>13</td><td>A company is looking to develop a mobile app with multiple iterations based on user feedback. They want to release the app in phases and improve it based on customer reviews. Which software development model would you recommend Agile or Waterfall and Justify your answer.

<b><u>Ans:</u></b>

<b>Agile model for developing the mobile app.</b>

<b>Justification:</b>

Agile follows an incremental and iterative approach, allowing the company to release the app in phases and continuously improve it based on user feedback. Unlike the Waterfall model, which is rigid and requires all requirements to be defined upfront, Agile enables frequent updates, flexibility, and customer collaboration, making it ideal for mobile apps where user preferences and market trends.</td><td>5</td><td>2</td><td>1</td><td>1</td><td>1.6.1</td></tr>
<tr><td>14</td><td>You are developing an online sales application for a retail company. Explain the functional and non-functional requirements that need to be considered to ensure the application meets business and user expectations.
<b><u>Ans</u>:</b>
<b>Functional Requirements:</b>
1. <b>User Authentication & Authorization</b> – Secure login, user roles (admin, customer, seller).</td><td>5</td><td>3</td><td>2</td><td>2</td><td>1.6.1</td></tr>
</table>

	2. **Product Catalog Management** – Add, update, and remove products with descriptions and images. 3. **Shopping Cart & Checkout** – Add to cart, apply discounts, and process secure payments. 4. **Order Management** – Order tracking, cancellations, and returns. 5. **Search & Filtering** – Advanced search with filters (price, category, brand). 6. **Customer Support** – Chat support, FAQs, and contact options. **Non-Functional Requirements:** 1. **Performance** – Fast load times and smooth transactions. 2. **Scalability** – Ability to handle growing users and products. 3. **Security** – Encryption, fraud detection, and secure payments. 4. **Usability** – Intuitive UI/UX for easy navigation. 5. **Reliability** – High availability and minimal downtime. 6. **Compliance** – Adherence to GDPR, PCI-DSS, and other legal standards.					
15	A project size of 220 KLOC is being developed in the embedded mode. The development team has limited experience in this type of project, and the project schedule is strict. Calculate the effort, development time, average staff size, and productivity of the project. Assume that the values of a=3.6, b=1.20, c=2.5 and d=0.32 respectively. **Ans:**  **Given Data:** • KLOC (Size) = 220 • a = 3.6, b = 1.20, c = 2.5, d = 0.32 **Formulas:** 1. **Effort (E) in Person-Months (PM):** $E = a \times (KLOC)^b$ 2. **Development Time (T) in Months:** $T = c \times (E)^d$ 3. **Average Staff Size (SS):** $SS = \frac{E}{T}$ 4. **Productivity (P):** $P = \frac{KLOC}{E}$	5	3	2	2	2.2.4

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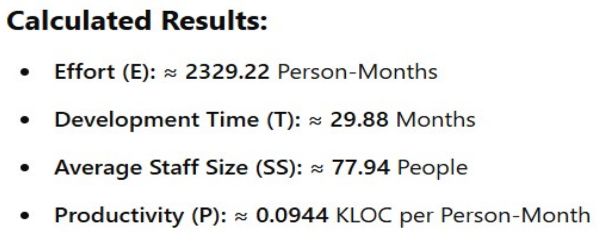
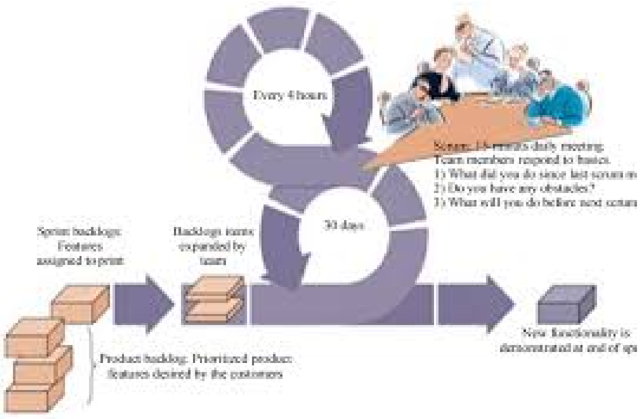
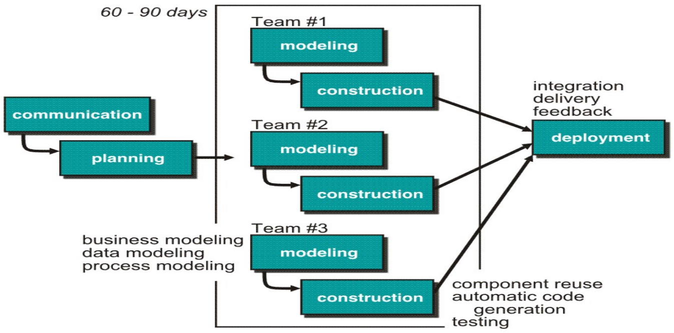
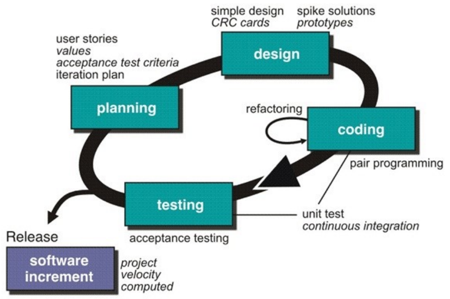
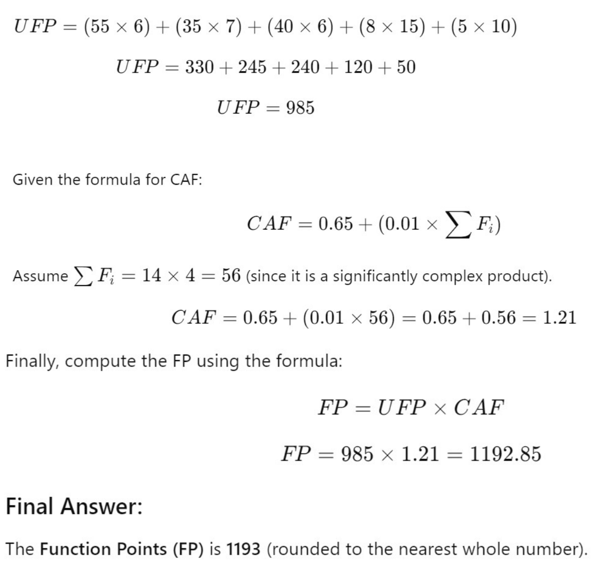
<tr><td></td><td>
Calculated Results:
• **Effort (E):** ≈ **2329.22** Person-Months
• **Development Time (T):** ≈ **29.88** Months
• **Average Staff Size (SS):** ≈ **77.94** People
• **Productivity (P):** ≈ **0.0944** KLOC per Person-Month</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="7">**Part – C (2 × 10 = 20 Marks) Instructions: Answer all**</td></tr>
<tr><td>16</td><td>i) Launching an e-commerce store sounds simple enough all you have to do is add some products, images, and descriptions, right? Nothing could be further from the truth. If you want to create a great ecommerce store, you need a great plan. Before ever adding products, design elements, or anything else, you need to have an ecommerce website requirements specification document. If you were a software engineer which methodology, would you use to develop the ecommerce store**.** Justify and explain in detail with example.
Ans:
For developing an e-commerce store, I would use the Agile methodology, specifically SCRUM.
Justification:
1. Flexibility & Iterations – Agile allows continuous improvements and adaptation to customer feedback.
2. Faster Delivery – The project is broken down into sprints, delivering working features every few weeks.
3. Customer-Centric Approach – Prioritizes user experience, allowing frequent testing and feedback.
4. Risk Management – Identifies and resolves issues early in incremental releases.
5. Collaboration – Encourages teamwork between developers, designers, and stakeholders.
ii) Illustrate the SCRUM process flow with proper diagram.


Every 4 hours
Scrum: 15 minute daily meeting.
Team members respond to basics:
1) What did you do since last scrum m
2) Do you have any obstacles?
3) What will you do before next scrum
30 days
Sprint backlog: Features assigned to sprint
Backlog items expanded by team
Product backlog: Prioritized product features desired by the customers
New functionality is demonstrated at end of sp

</td><td>6
4</td><td>5</td><td>1</td><td>1</td><td>1.6.1</td></tr>
<tr><td colspan="7">**(OR)**</td></tr>
</table>

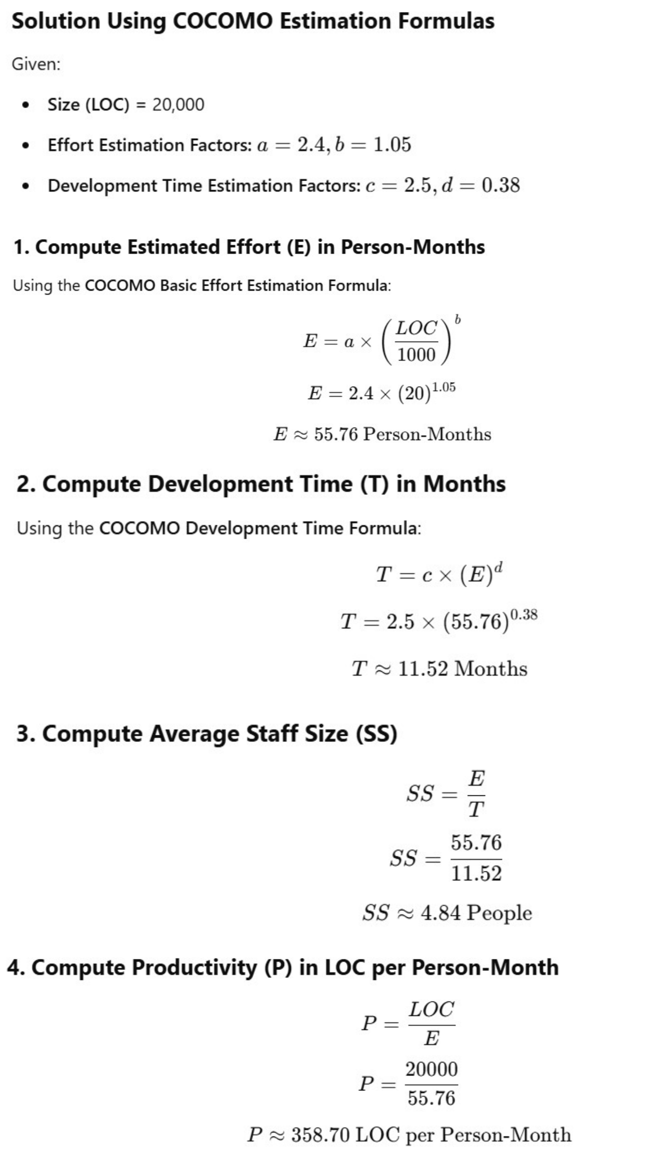
17	i) Rojer wants a software application. Assume that you are a software developer of a company. Rojer has approached you to for a better solution of the problem faced by their side. He stated that the application must be released within 90 days, and you may use reuse mechanism. Justify with a neat pictorial representation, which model will you opt for software development and explain in detail with neat sketch. **Ans:** **Recommended Software Development Model: RAD (Rapid Application Development)** Since Rojer requires the software application to be delivered within 90 days and allows the use of reuse mechanisms, the Rapid Application Development (RAD) model is the best choice. Justification: 1. Fast Development: RAD focuses on rapid prototyping, iterative development, and early user feedback. 2. Component Reusability: Encourages the use of pre-built components to reduce development time. 3. Parallel Development: Different modules are developed simultaneously, ensuring faster delivery. 4. Customer Involvement: Continuous feedback helps refine and improve the application. 5. Flexibility: Changes can be incorporated without delaying the project timeline.  60 - 90 days Team #1 modeling construction Team #2 modeling construction Team #3 modeling construction communication planning integration delivery feedback deployment business modeling data modeling process modeling component reuse automatic code generation testing ii) Summarize the Extreme Programming life cycle. **Ans:** Extreme Programming (XP) is an Agile software development methodology that emphasizes frequent releases, customer collaboration, and adaptability. The XP life cycle consists of the following key phases: 1. Planning Phase 2. Design Phase 3. Coding Phase	6 4	4	1	1	1.6.1

	4. Testing Phase 5. Release & Maintenance Phase  simple design CRC cards spike solutions prototypes user stories values acceptance test criteria iteration plan design planning refactoring coding pair programming testing unit test continuous integration Release acceptance testing software increment project velocity computed					
18	Given the Following Values, calculate the Functional Point when complexity adjustment factors are significantly complex product and weighting factors are high. - User input = 55 - User Output = 35 - User Enquires = 40 - User Files = 8 - External Interfaces = 5 Weighting Factors for a High Complexity Product: User Input Weight = 6, User Output Weight = 7, User Enquiries Weight = 6, User Files Weight = 15, External Interfaces Weight = 10 1: Compute the Unadjusted Function Points (UFP) 2: Compute Complexity Adjustment Factor (CAF) 3: Calculate Final Function Points (FP) **Ans**:  $UFP = (55 \times 6) + (35 \times 7) + (40 \times 6) + (8 \times 15) + (5 \times 10)$ $UFP = 330 + 245 + 240 + 120 + 50$ $UFP = 985$ Given the formula for CAF: $CAF = 0.65 + (0.01 \times \sum F_i)$ Assume $\sum F_i = 14 \times 4 = 56$ (since it is a significantly complex product). $CAF = 0.65 + (0.01 \times 56) = 0.65 + 0.56 = 1.21$ Finally, compute the FP using the formula: $FP = UFP \times CAF$ $FP = 985 \times 1.21 = 1192.85$ **Final Answer:** The **Function Points (FP)** is **1193** (rounded to the nearest whole number).	10	3	2	2	2.6.3
	(OR)					
19	A simple stand-alone software utility is to be developed in C programming by a team of software experts for a computer running Linux. The overall size of this software is estimated to be 20,000 lines of code (LOC). Considering the following parameters for	10	3	2	2	2.6.3

COCOMO effort estimation: Effort estimation factors (a, b) = (2.4, 1.05), development time estimation factors (c, d) = (2.5, 0.38)

Calculate the estimated effort (in person-months), development time (in months), staff size, and productivity for this software project.

Ans:



Solution Using COCOMO Estimation Formulas

Given:

- Size (LOC) = 20,000
- Effort Estimation Factors: $a = 2.4, b = 1.05$
- Development Time Estimation Factors: $c = 2.5, d = 0.38$

1. Compute Estimated Effort (E) in Person-Months

Using the **COCOMO Basic Effort Estimation Formula**:

$$E = a \times \left(\frac{LOC}{1000}\right)^b$$

$$E = 2.4 \times (20)^{1.05}$$

$$E \approx 55.76 \text{ Person-Months}$$

2. Compute Development Time (T) in Months

Using the **COCOMO Development Time Formula**:

$$T = c \times (E)^d$$

$$T = 2.5 \times (55.76)^{0.38}$$

$$T \approx 11.52 \text{ Months}$$

3. Compute Average Staff Size (SS)

$$SS = \frac{E}{T}$$

$$SS = \frac{55.76}{11.52}$$

$$SS \approx 4.84 \text{ People}$$

4. Compute Productivity (P) in LOC per Person-Month

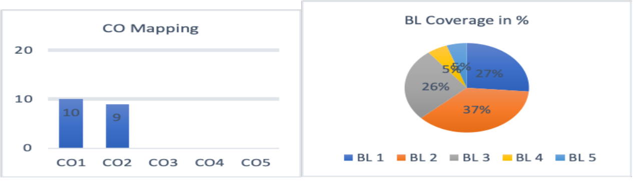
$$P = \frac{LOC}{E}$$

$$P = \frac{20000}{55.76}$$

$$P \approx 358.70 \text{ LOC per Person-Month}$$

***Performance Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy.**

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions



Approved by the Audit Professor/Course Coordinator