Higher Diploma in Science in Computer Science

2024-2026

Rosanne Birney
Database

David Drohan
Mobile App

Jimmy McGibney
Devops
Security

Siobhan Roche
Programming

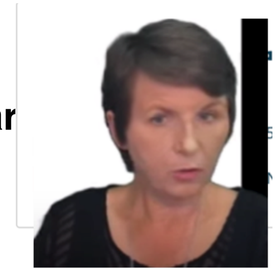
Caroline Cahill
Computer Systems

Richard Frisby
Devops

Laura McGibney
Student
Engagement

Frank Walsh
Computer System
Full Stack 2

Eamonn de Leastar
Full Stack 2



Mary Lyng
Database

Mairead Meagher
Programming

Peter Windle
Programming

Colm Dunphy
Project

Joan Mangan
Programme &
Placement
Coordinator

John Rellis
Web Dev 1
Web Dev 2

HDIP
24

Agenda

1. Context & Objectives
2. Programme Structure
3. Semesters & Modules
4. Calendar, Timetable & Assessment Sequencing
5. Module Summaries

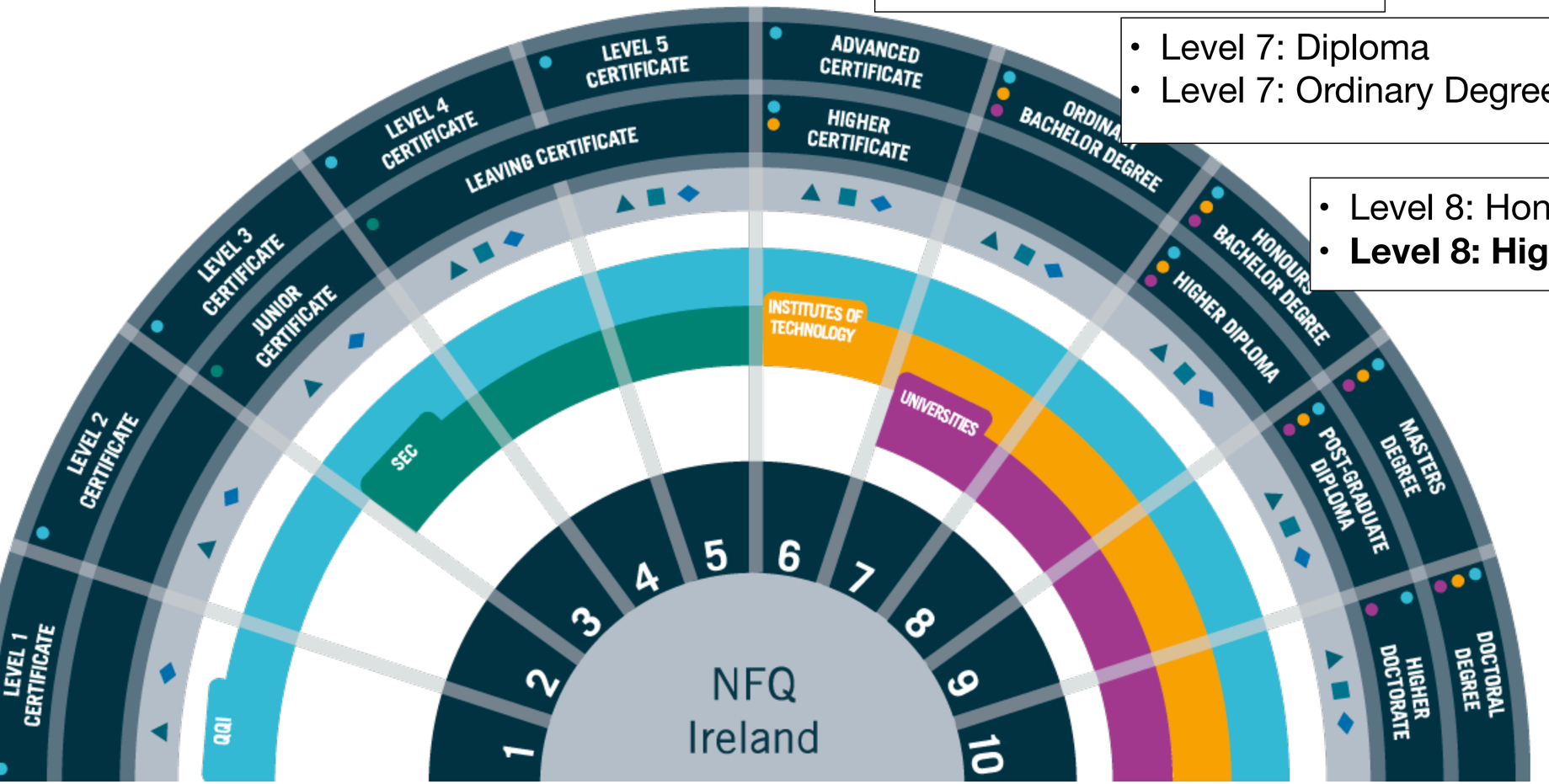
1. Context & Objectives

National Framework of Qualifications / Levels

- Level 6: Certificate
- Level 6: Higher Certificate

- Level 7: Diploma
- Level 7: Ordinary Degree

- Level 8: Honours Degree
- **Level 8: Higher Diploma**



https://nfq.qqi.ie/

ADVANCED CERTIFICATE	ORDINARY BACHELOR DEGREE	HONOURS BACHELOR DEGREE	MASTERS DEGREE	DOCTORAL DEGREE
HIGHER CERTIFICATE		HIGHER DIPLOMA	POST-GRADUATE DIPLOMA	HIGHER DOCTORATE

Key Programme **Features**

- Immersion
- Specialisation
- Industry Partnership

Immersion in Computing Knowledge

*"The participants will be **graduates** who have already obtained significant **transferable skills** by comparison with other undergraduate students..."*

*"**Semester 1** participants will undertake a broad immersive set of modules in the **fundamentals** of computing..."*

*"The **pace** of delivery will have to be **significantly higher** than for normal undergraduate programmes..."*

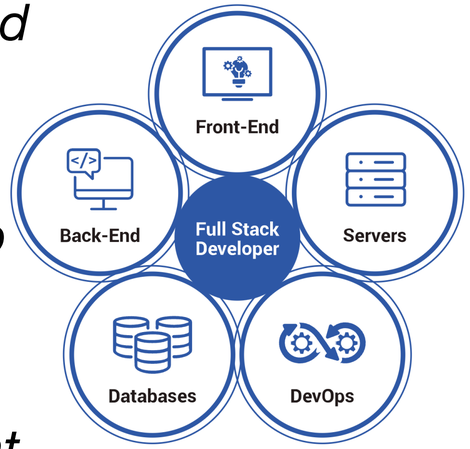
**'ICT and Software Development Skills Programme' HEA Call for Proposals / Terms & Conditions, November 2012*

Deepening and Specialisation

*"In **semester 2 ... a specialisation** which reflects their own strengths as demonstrated on the programme to date..."*

*".. a focused set of modules and project-work designed to bring candidates quickly to the industry entry standard ..." **Junior Software Developer (Full Stack Oriented)***

"Participants will be expected to select their specialisation based on their achievement in semester 1 and their own ambitions..."



*'ICT and Software Development Skills Programme' HEA Call for Proposals / Terms & Conditions, November 2012

Industry experience and professional development

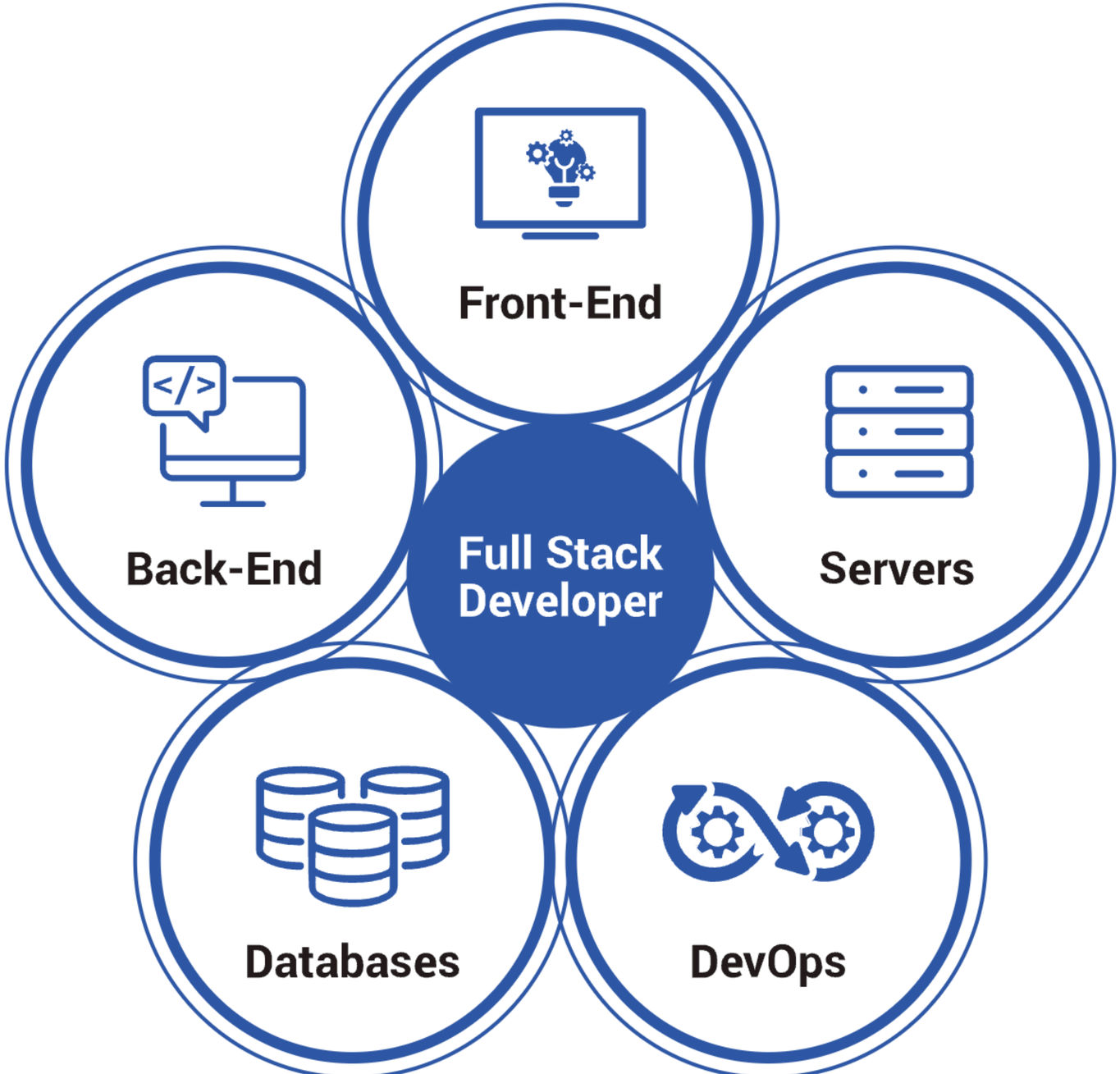
*"**Internships** or **work placements** are seen as crucial to providing graduates with the context and confidence in their new knowledge..."*

"Outputs expected from the work placement would include a work placement report, a project ideally conducted in the work placement organisation..."

*"...academic and **industry partners** will cooperate in the provision of appropriate academic supervision resources for the duration of this work placement activity..."*

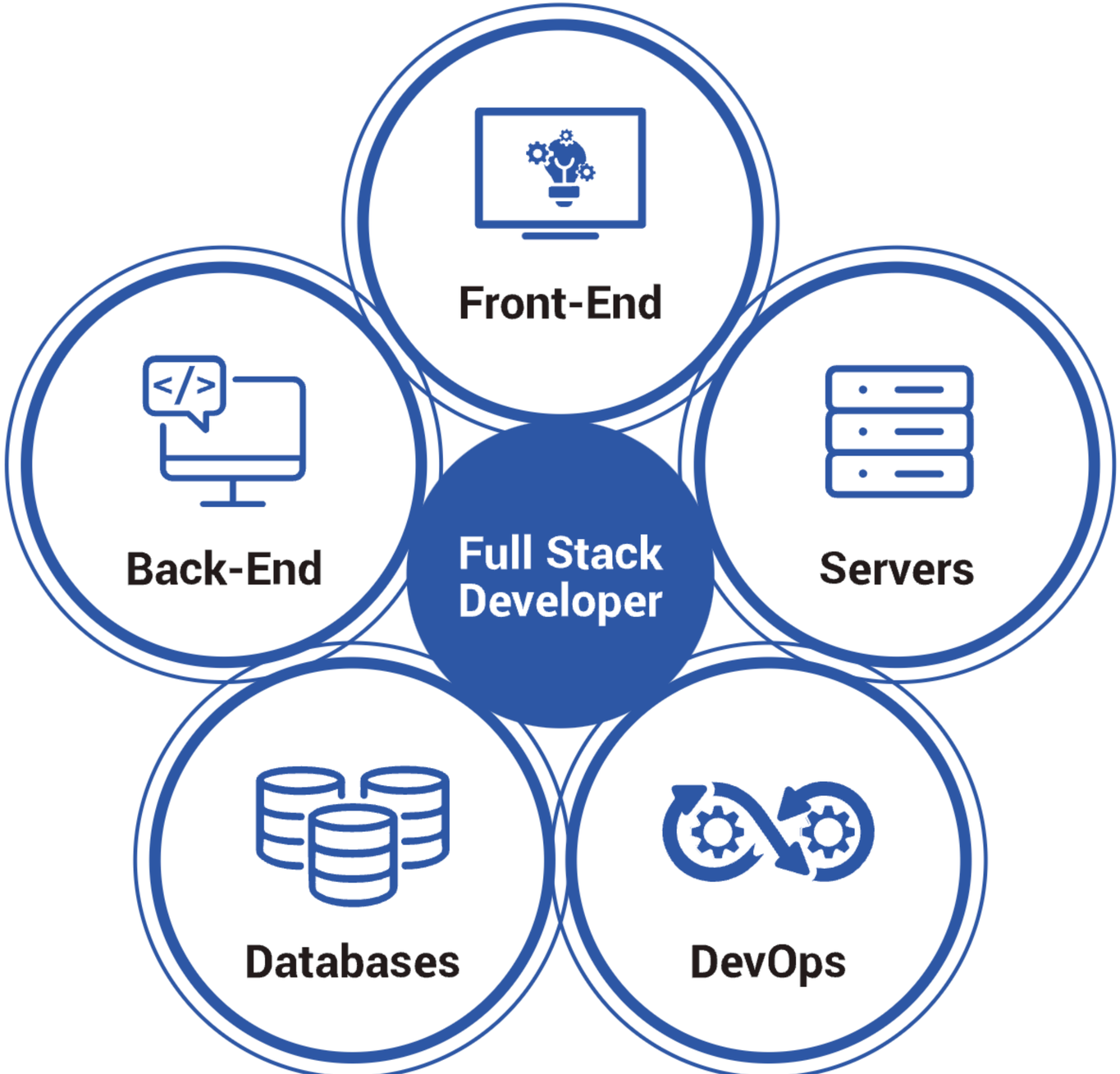
**'ICT and Software Development Skills Programme' HEA Call for Proposals / Terms & Conditions, November 2012*

2. Programme Structure


Front-End
Back-End
Full Stack Developer
Servers
Databases
DevOps

Programming

algorithms · data structures · processing · java · classes · libraries

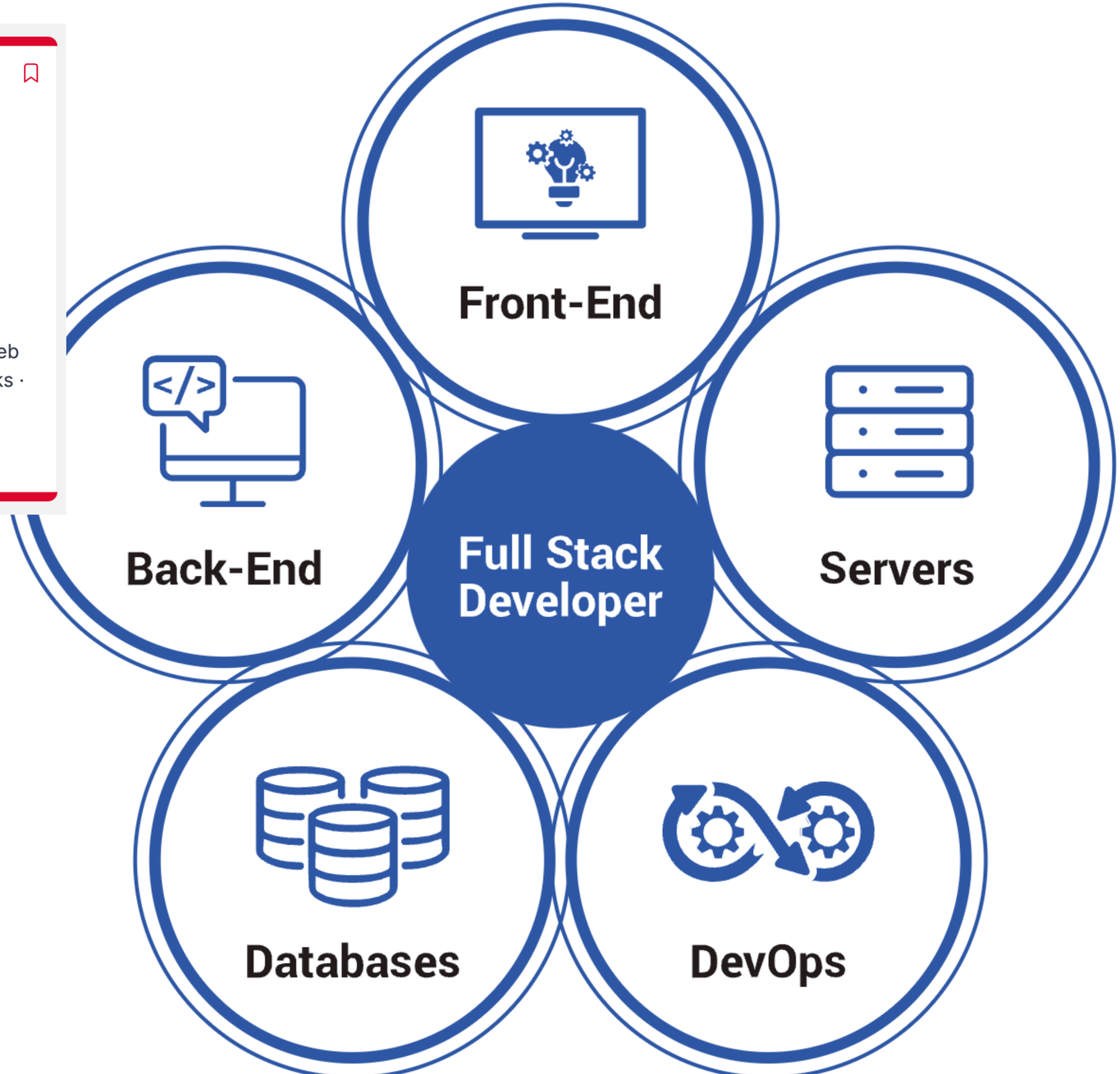


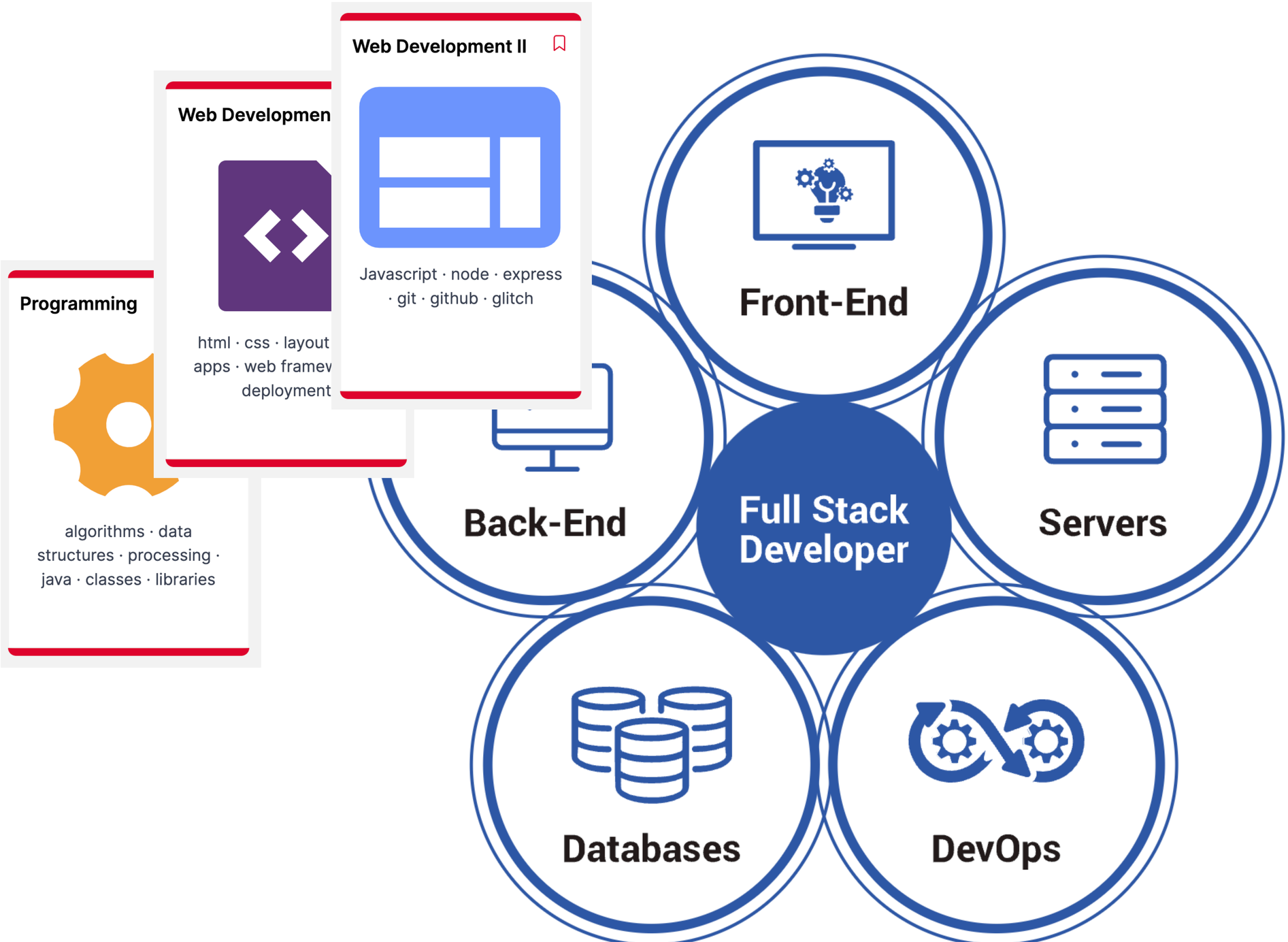
Web Development I

html · css · layout · web apps · web frameworks · deployment

Programming

algorithms · data structures · processing · java · classes · libraries




Web Development II
Javascript · node · express · git · github · glitch
Web Developmen
html · css · layout
apps · web framev
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Programming
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Front-End
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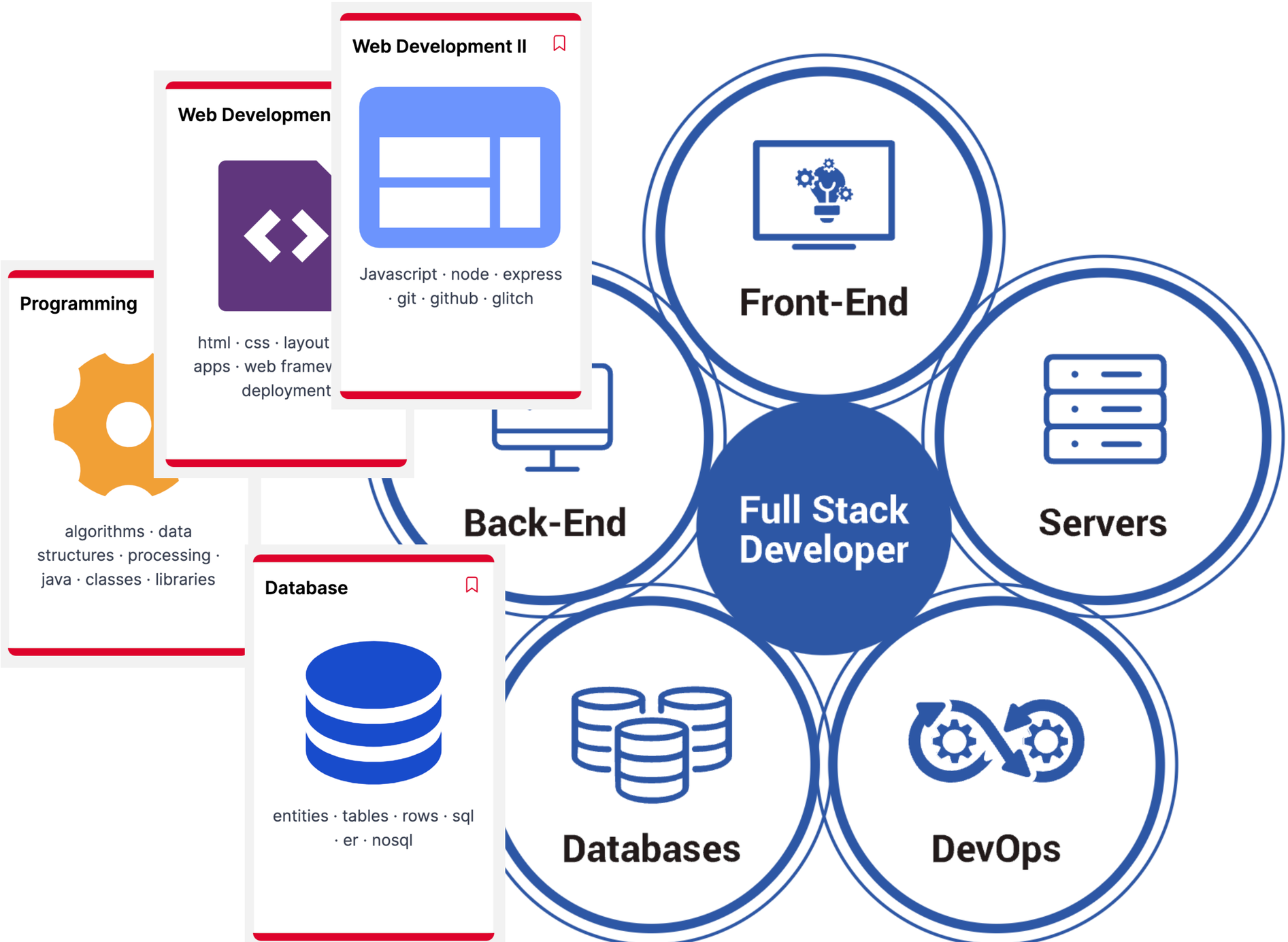
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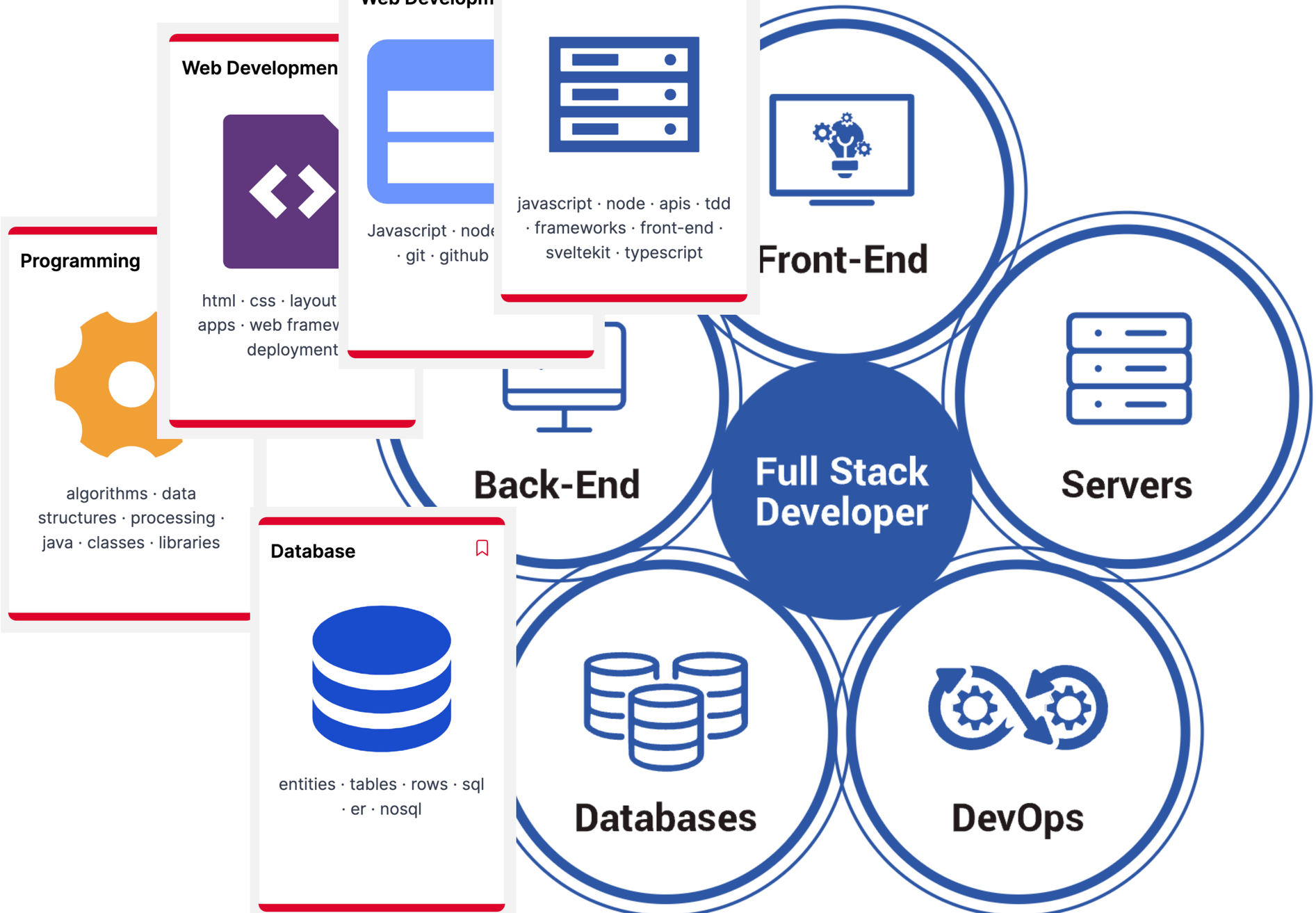
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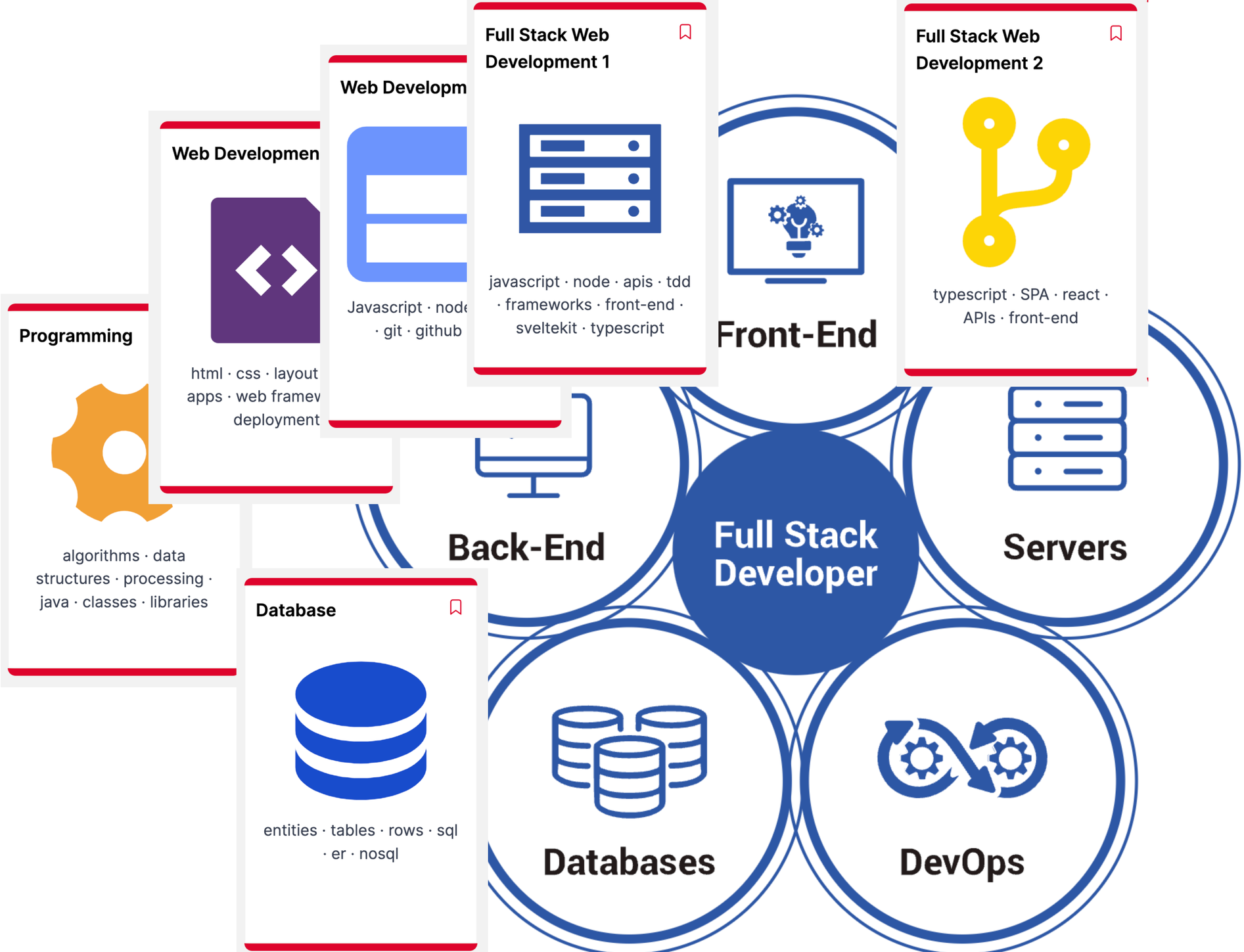
Programming
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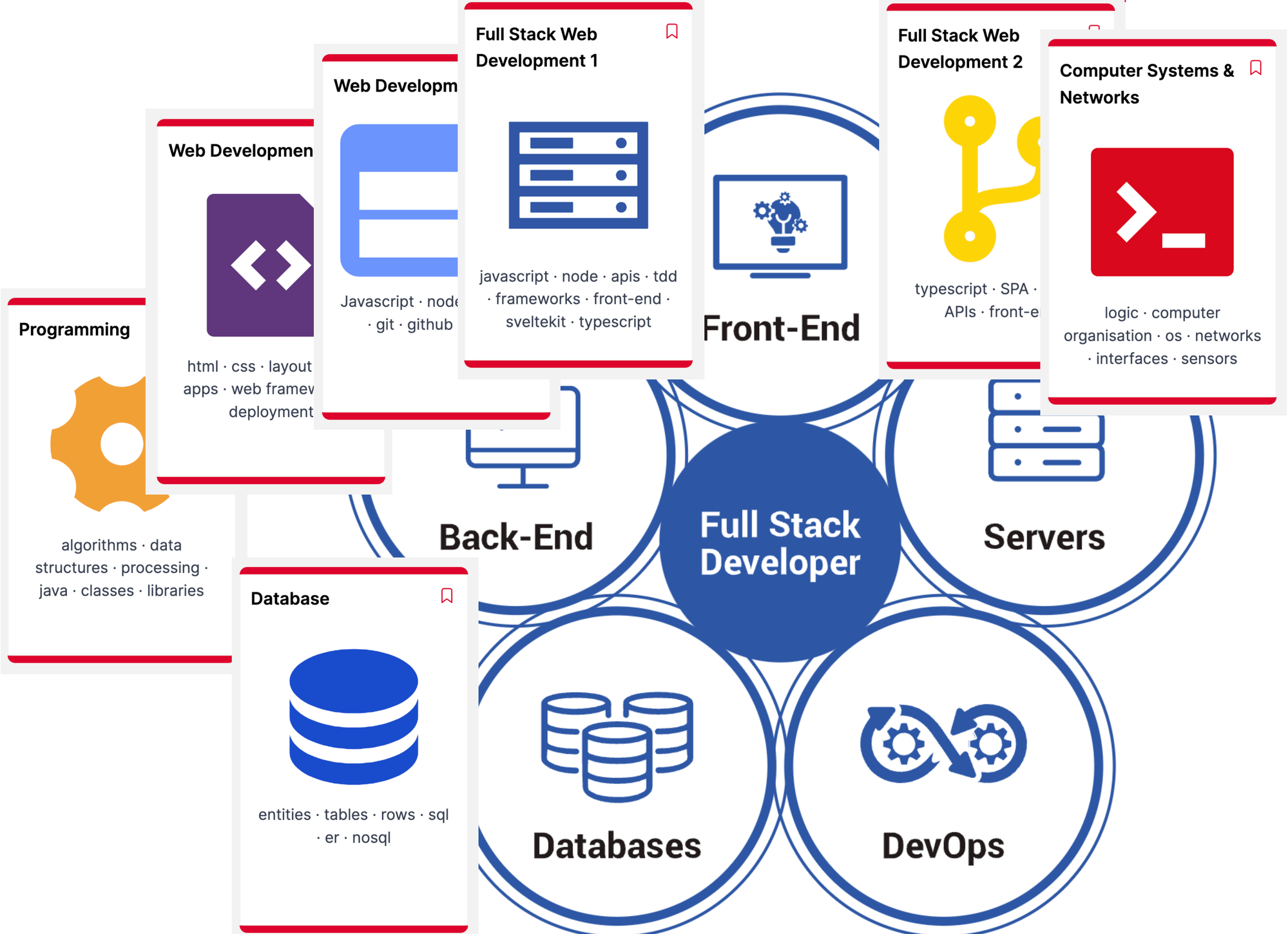
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Front-End
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APIs · front-e
Computer Systems & Networks
logic · computer organisation · os · networks · interfaces · sensors
Back-End
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Database
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Databases
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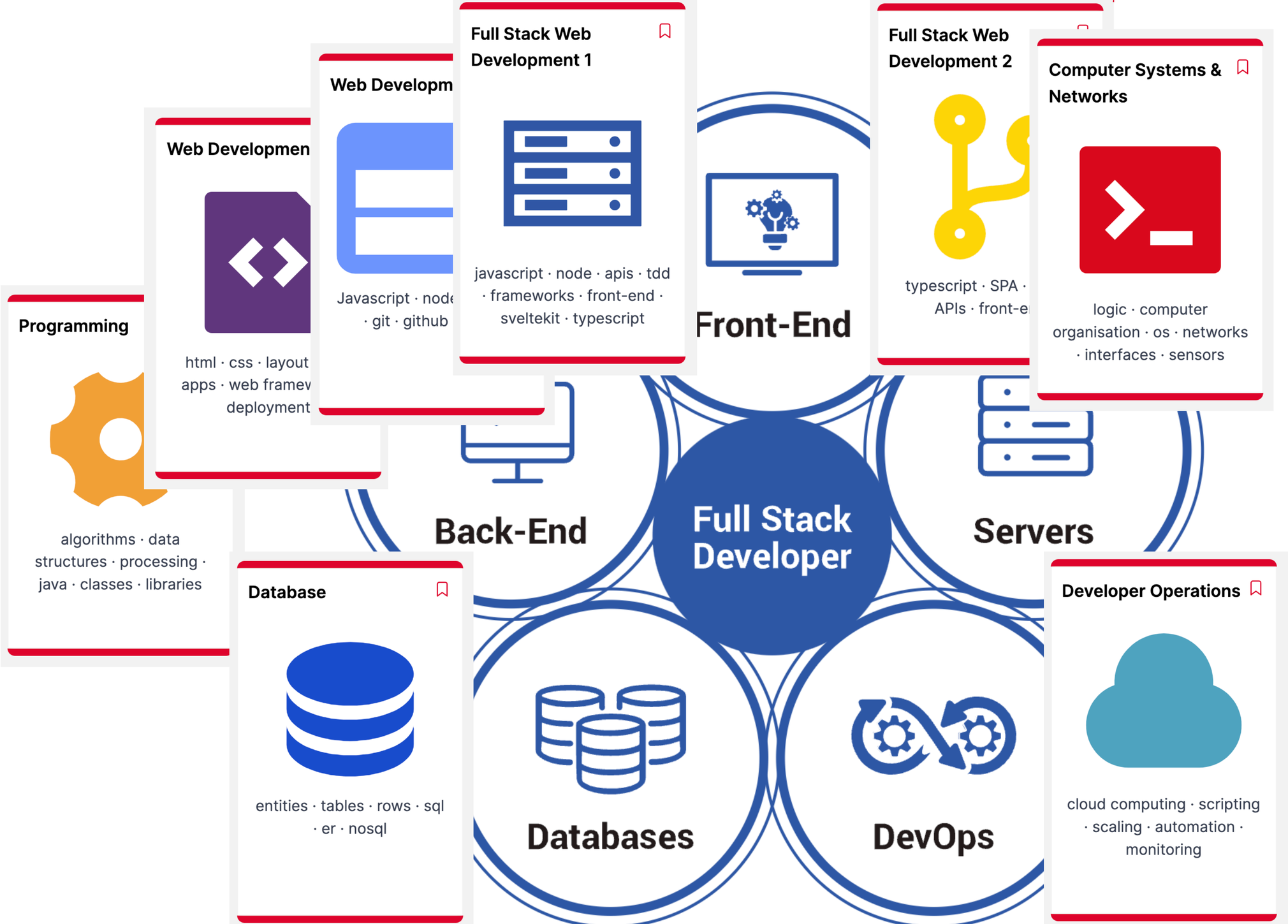
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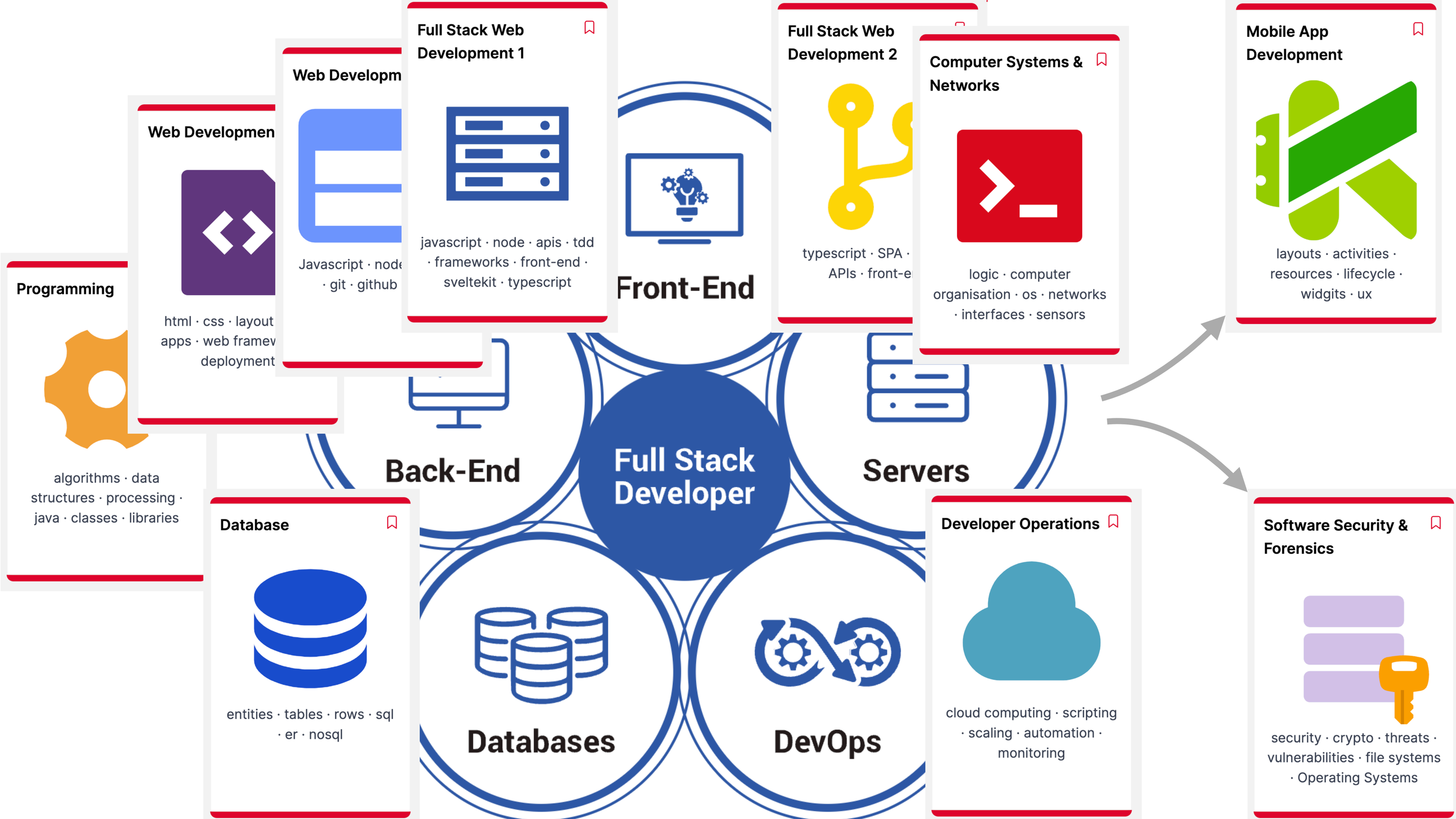
Developer Operations
cloud computing · scripting · scaling · automation · monitoring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Computer Systems & Networks
logic · computer organisation · os · networks · interfaces · sensors
Mobile App Development
layouts · activities · resources · lifecycle · widgits · ux
Web Developm
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Programming
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Database
entities · tables · rows · sql · er · nosql
Developer Operations
cloud computing · scripting · scaling · automation · monitoring
Software Security & Forensics
security · crypto · threats · vulnerabilities · file systems · Operating Systems

Programming

algorithms · data structures · processing · java · classes · libraries

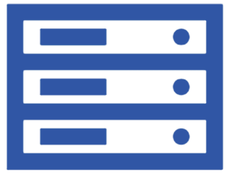
Web Developmen

html · css · layout
apps · web framev
deployment

Web Developm

Javascript · node
· git · github

Full Stack Web Development 1



javascript · node · apis · tdd · frameworks · front-end · sveltekit · typescript

Front-End

Full Stack Web Development 2

typescript · SPA ·
APIs · front-e

Computer Systems & Networks

logic · computer organisation · os · networks · interfaces · sensors

Mobile App Development

layouts · activities · resources · lifecycle · widgits · ux

Project & Placement

CV Preparation · placement · project handbook · showcases · samples

Servers

Database

entities · tables · rows · sql · er · nosql

Databases

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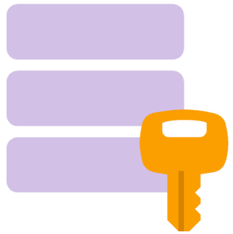
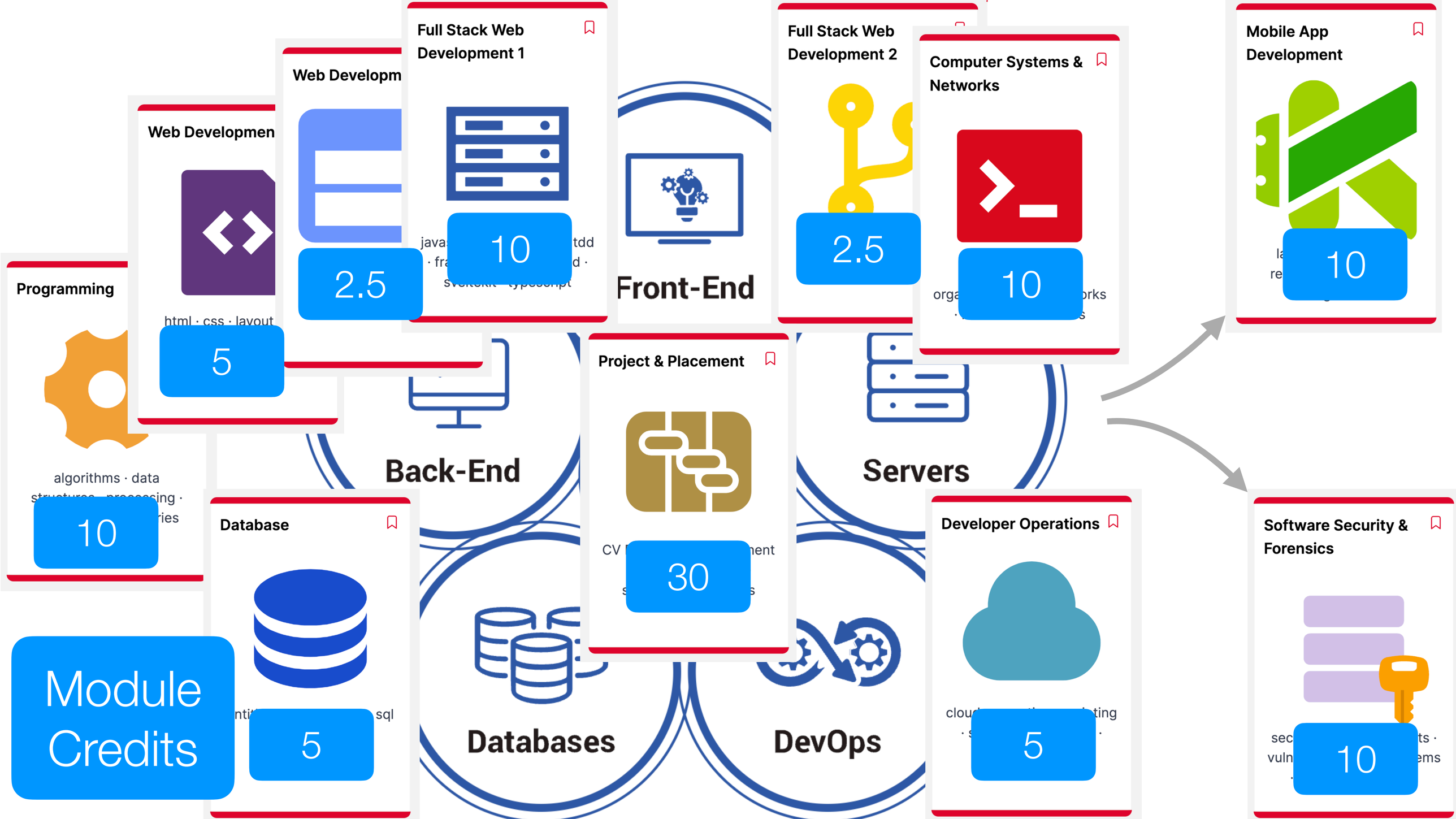
cloud computing · scripting · scaling · automation · monitoring

Software Security & Forensics



security · crypto · threats · vulnerabilities · file systems · Operating Systems


Module Credits
Programming
algorithms · data
10
Web Developmen
html · css · layout
5
Web Developm
2.5
Full Stack Web Development 1
10
Front-End
Full Stack Web Development 2
2.5
Computer Systems & Networks
10
Mobile App Development
10
Back-End
Project & Placement
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Servers
Database
sql
5
Databases
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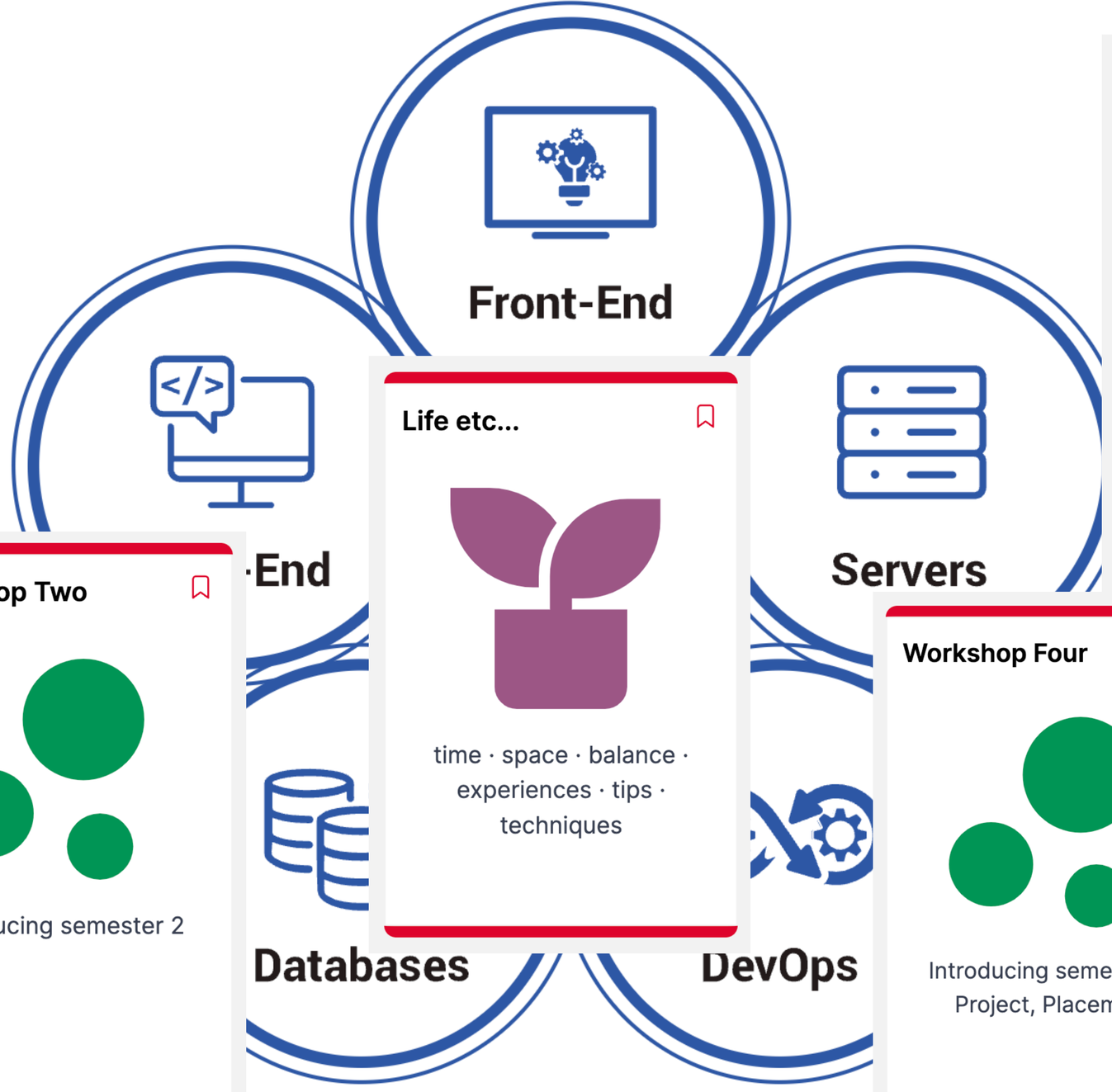
Software Security & Forensics
10



Workshop One

induction · structure · schedules · handbook

Workshop Two

Introducing semester 2

Life etc...

time · space · balance · experiences · tips · techniques

Workshop Three

agile methods · cv preparation · introducing semester 3

Workshop Four

Introducing semester 4, Project, Placement

Workshop Five

Friday January 12th, 2024

3. Semesters & Modules

Semester 1:
Jan-June 2024

Semester 2:
June-Dec 2024

Semester 3:
Jan-June 2025

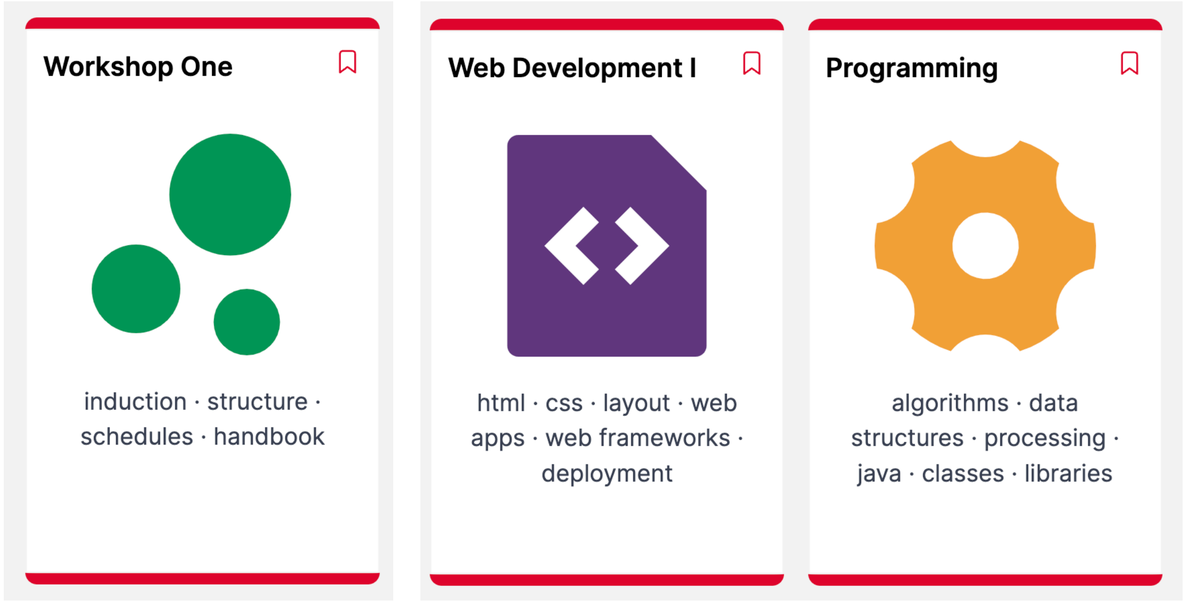
Semester 4:
June-Dec 2025

June 2025 - May 2026

Project/Work Placement

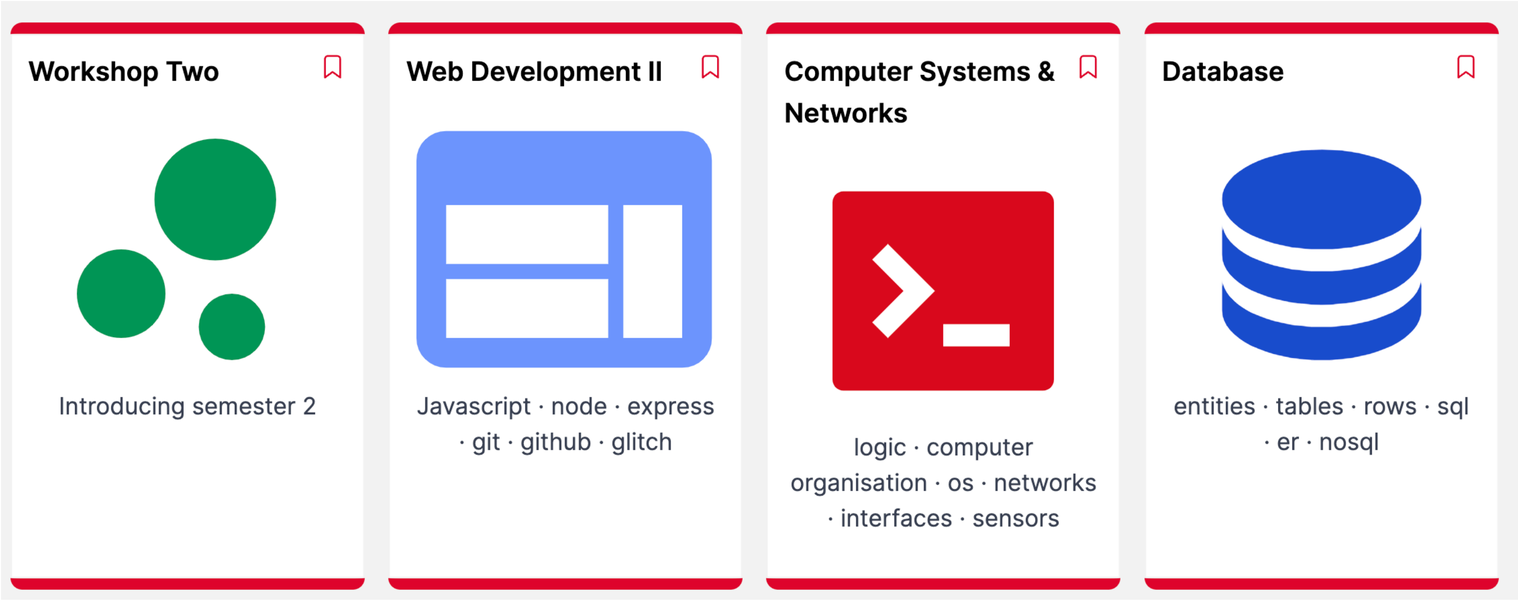
(Work Placement 4-6 months)

Semester 1: January - June 2024



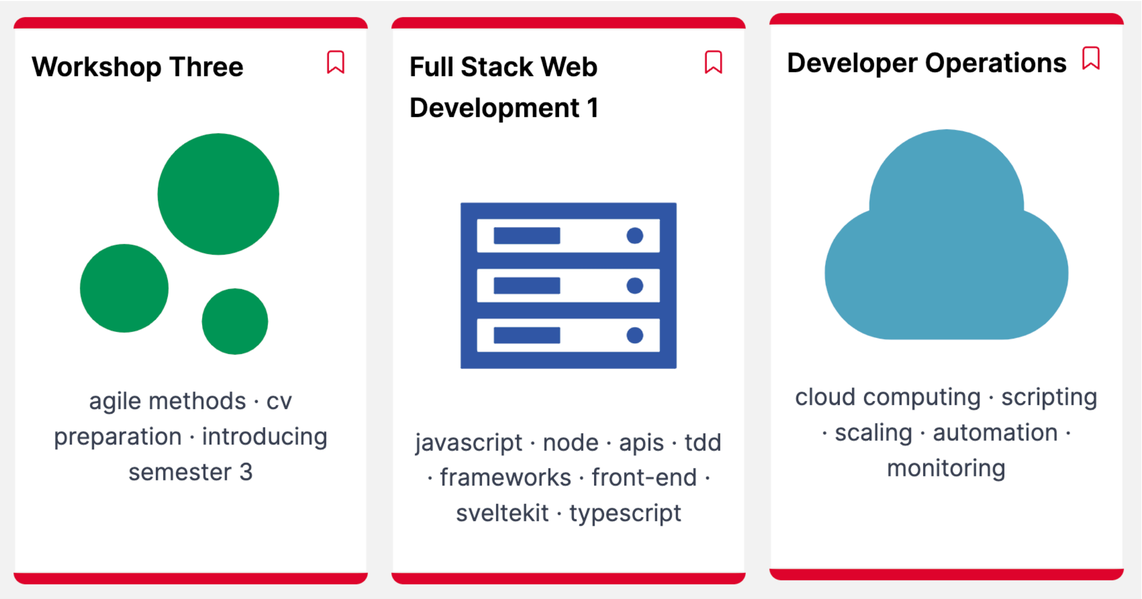
*"..a broad immersive set of modules in the fundamentals of computing covering **software development, systems analysis & testing**, databases, architecture, OS & networking, **web design / user-experience..**"*

Semester 1: June - December 2024



*"..a broad immersive set of modules in the **fundamentals of computing** covering software development, systems analysis & testing, **databases, architecture, OS & networking**, web design / user-experience.."*

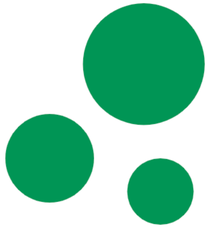
Semester 3: January - June 2025



"… students are expected to take a specialisation which reflects their own strengths as demonstrated on the programme to date..."

Semester 4: June - December 2025

Workshop Four



Introducing semester 4, Project, Placement

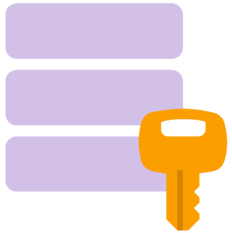
Full Stack Web Development 2

typescript · SPA · react · APIs · front-end

Mobile App Development

layouts · activities · resources · lifecycle · widgits · ux

Software Security & Forensics

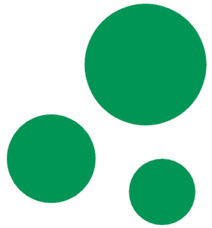


security · crypto · threats · vulnerabilities · file systems · Operating Systems

"… students are expected to take a specialisation which reflects their own strengths as demonstrated on the programme to date..."

Semester 4: September 2025 - May 2026

Workshop Five



Friday January 12th, 2024

Project & Placement

CV Preparation · placement · project handbook · showcases · samples

“Internships or work placements are seen as crucial to providing graduates with the context and confidence in their new knowledge...”

4. Calendar, Timetable & Assessment Sequencing

Semester 1

2024

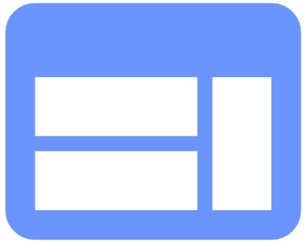
Programming

algorithms · data structures · processing · java · classes · libraries

Web Development I

html · css · layout · web apps · web frameworks · deployment

Web Development II



Javascript · node · express · git · github · glitch

		S	M	T	W	T	F	S
	Week	1	1	2	3	4	5	6
January		7	8	9	10	11	12	13
	1	14	15	16	17	18	19	20
	2	21	22	23	24	25	26	27
	3	28	29	30	31	1	2	3
February	*reading*	4	5	6	7	8	9	10
	4	11	12	13	14	15	16	17
	5	18	19	20	21	22	23	24
	reading	25	26	27	28	29	1	2
March	6	3	4	5	6	7	8	9
	7	10	11	12	13	14	15	16
	8	17	18	19	20	21	22	23
	Easter 1	24	25	26	27	28	29	30
April	*Easter 2*	31	1	2	3	4	5	6
	9	7	8	9	10	11	12	13
	10	14	15	16	17	18	19	20
	11	21	22	23	24	25	26	27
May	12	28	29	30	1	2	3	4
		5	6	7	8	9	10	11
		12	13	14	15	16	17	18
	13	19	20	21	22	23	24	25
	14	26	27	28	29	30	31	1
June	14	2	3	4	5	6	7	8
	16	9	10	11	12	13	14	15
	17	16	17	18	19	20	21	22
		23	24	25	26	27	28	29
July		30	1	2	3	4	5	6

Workshop One

induction · structure · schedules · handbook

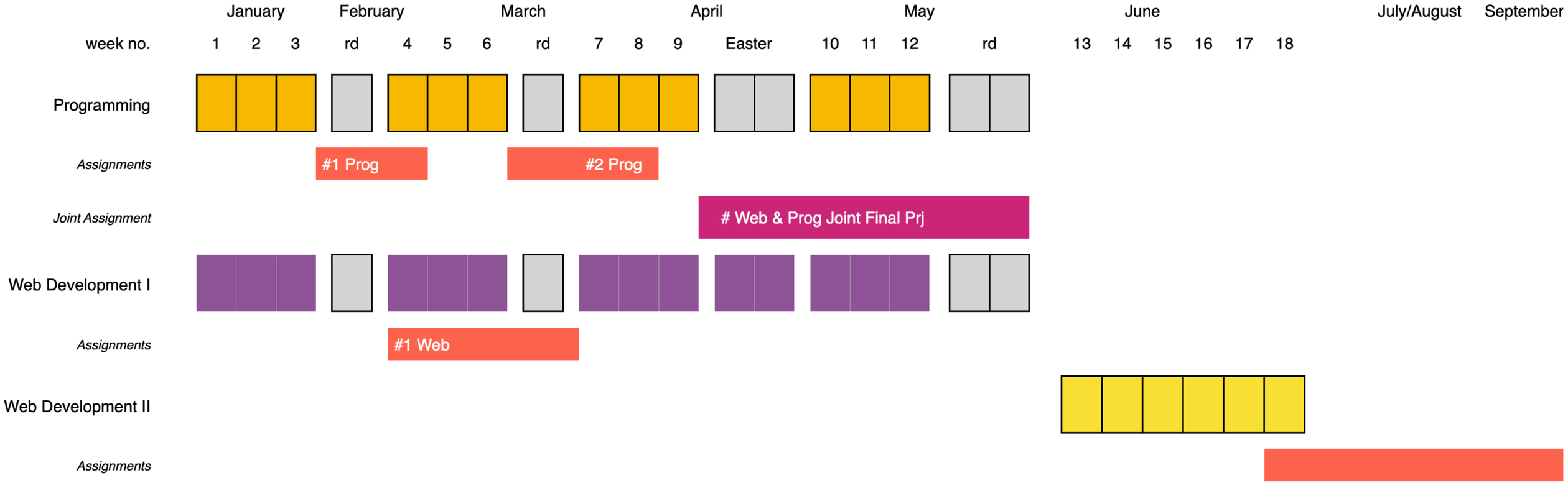
Workshop Two

Introducing semester 2

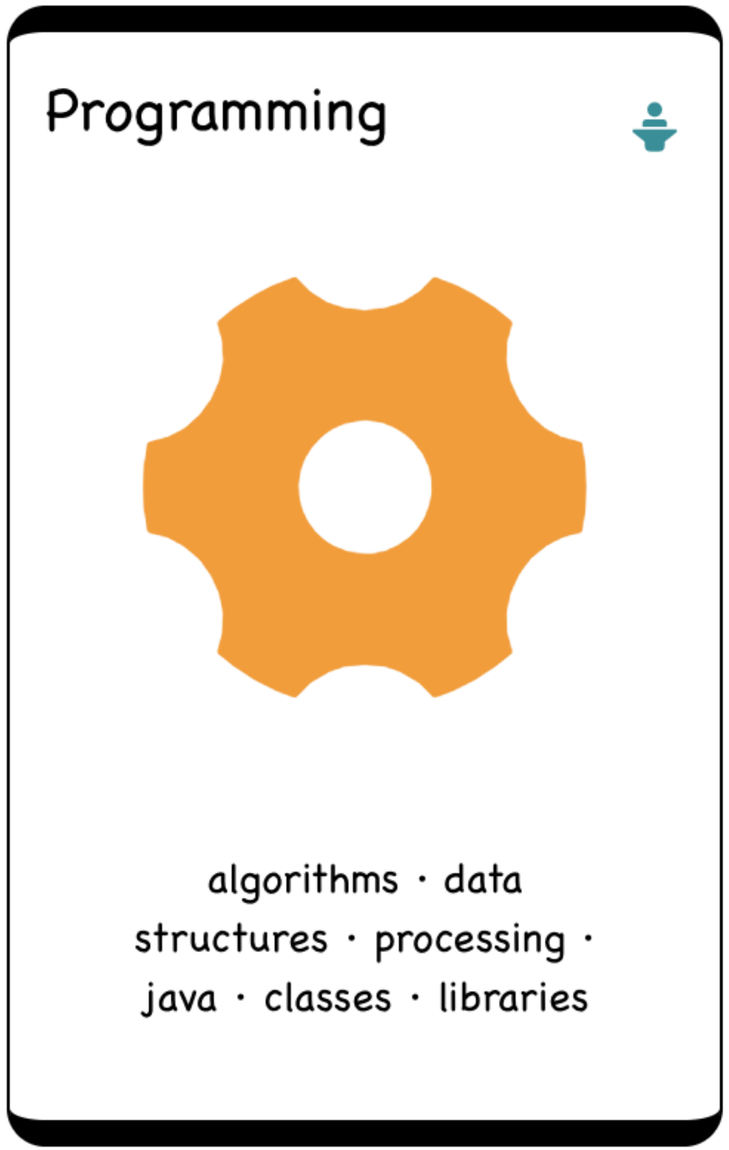
Weekly Webinar Schedule

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	
10:45						10:45
12:15	Programming *Webinar* 12:15-2:00		Programming *Webinar* 12:15-2:00	Web Development *Webinar* 12:15-2:00		12:15
2:00						13:45
15:15						15:15

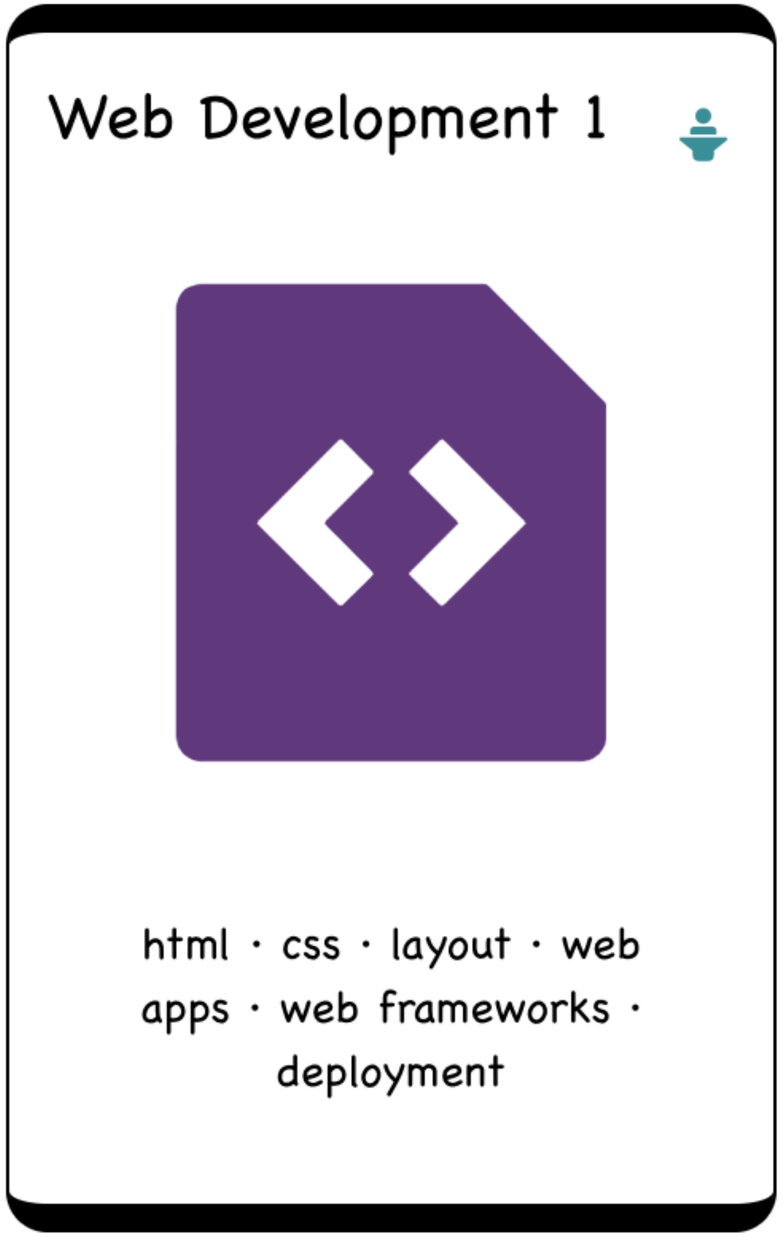
Semester 1 Assessment Schedule



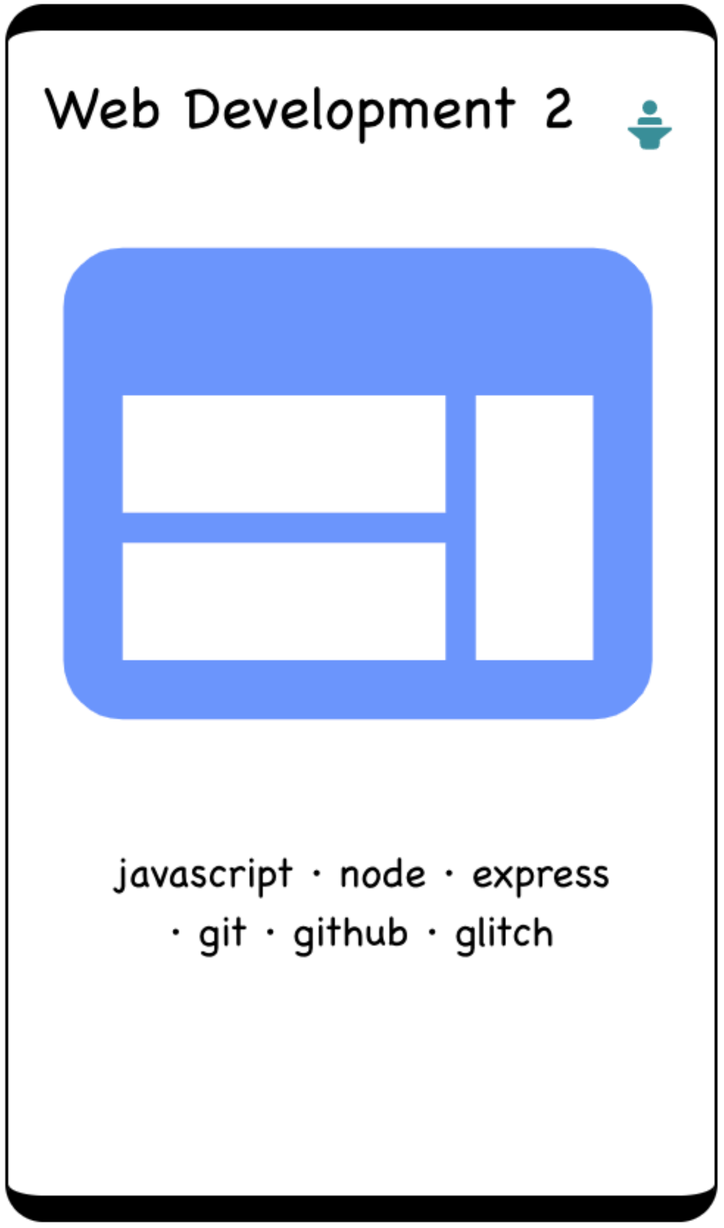
4. Module Summaries



- Apply core problem solving approaches suitable to the programming discipline to build algorithms.
- Construct small applications using standard sequence, conditional and iterative control structures. Change and expand small applications.
- Construct small applications that use simple UI, computation and data structures.
- Apply techniques to effectively test, debug and document small applications.
- Defend and explain how the above applications work.
- Apply problem-solving strategies to various computing problems of increasing complexity.
- Plan, code, test and document applications using advanced programming constructs and data structures



- Understand the fundamentals of the HTML markup language.
- Understand the role of Human Computer Interaction and manipulate CSS to present HTML content.
- Be able to integrate HTML, CSS and Java script to structure simple web sites.
- Understand how a dynamic web page is generated and be familiar with the role of html templating techniques
- Understand the difference between a web site and a web app. Be able to design and implement a simple web app.
- Implement a simple Model View Controller application pattern for a web app.

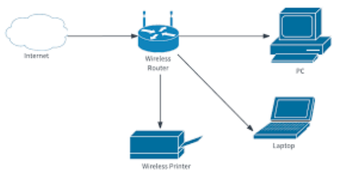


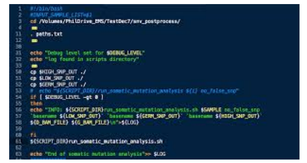
- Continue the journey into web application development
- Establish a competence in Javascript programming language
- Explore the basics of the Node.js framework
- Use a simple JSON persistent storage database
- Design, build and deploy a complete web application using these tools
- Understand the role of Agile methods in this context

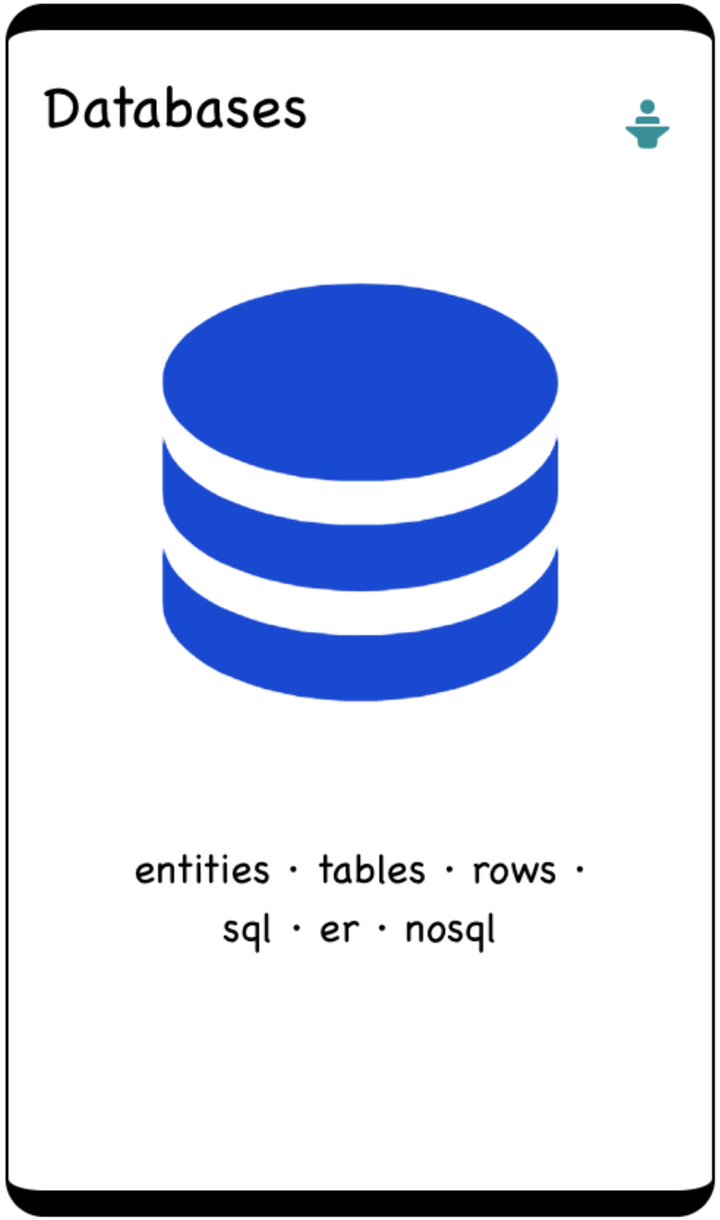
Computer Systems & Networks

logic · computer organisation · os · networks · interfaces ·...

- Identify and explain the role various hardware components play in a computer system.
- Use an operating system on a chosen computer architecture.
- Demonstrate an ability to configure systems using the command line.
- Describe the memory management, process management and file management components of a modern operating system.
- Explain basic concepts and theory of networked operating systems and virtualisation.
- Configure a contemporary operating system (within a virtual machine environment)
- Demonstrate competency in a limited set of utilities provided by a contemporary operating system.







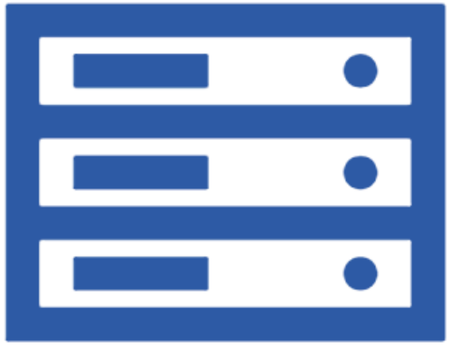
- Discuss the role of a database and its management system.
- Draw Entity Relationship (ER) diagram from an application problem and reproduce this diagram into a set of normalised relations, which are ready for database implementation.
- Design a NoSQL database suitable for a distributed environment with consideration of the CAP theorem.
- Gain an understanding of the physical database design process, its objectives and deliverables.
- Design and implement a database system

MySQL™

ORACLE

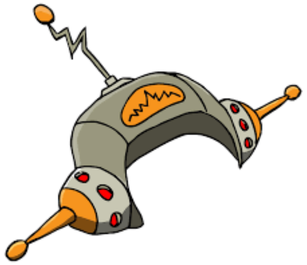
mongoDB®

Full Stack Development 1

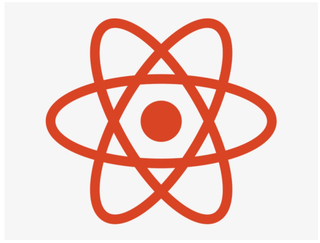


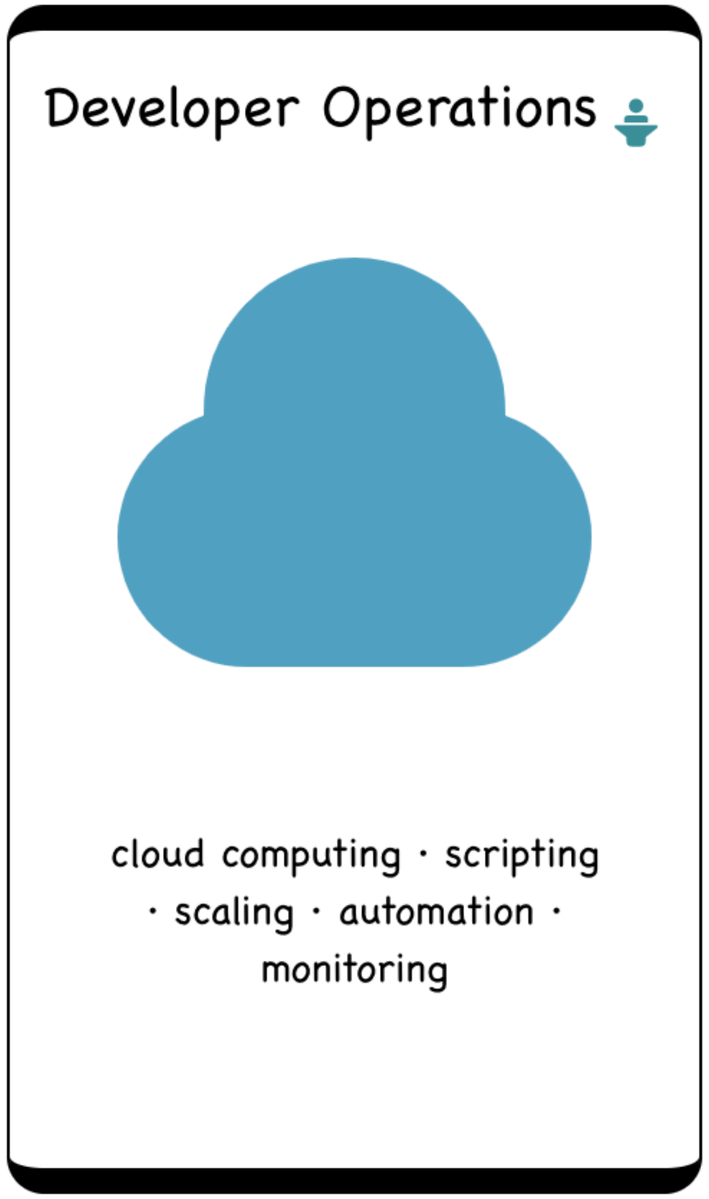
javascript · node · apis · tdd · frameworks · front-end · svelte

- Examine the key components of a server rendered web application and incorporate them into a running application.
- Use Model View Controller & related patterns in the implementation of a web project.
- Relate the request/response lifecycle, routing & session management in the context of a modern application framework.
- Model the user requirements and realize the model in a simple database.
- Apply best practice principles and patterns to the design and documentation of a web API.
- Apply best practice principles and patterns to the design of a medium-sized Single Page Web App.
- Develop an end-to-end web app that supports session management and persistence for a constrained functional requirement set.

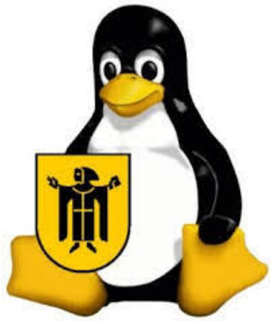


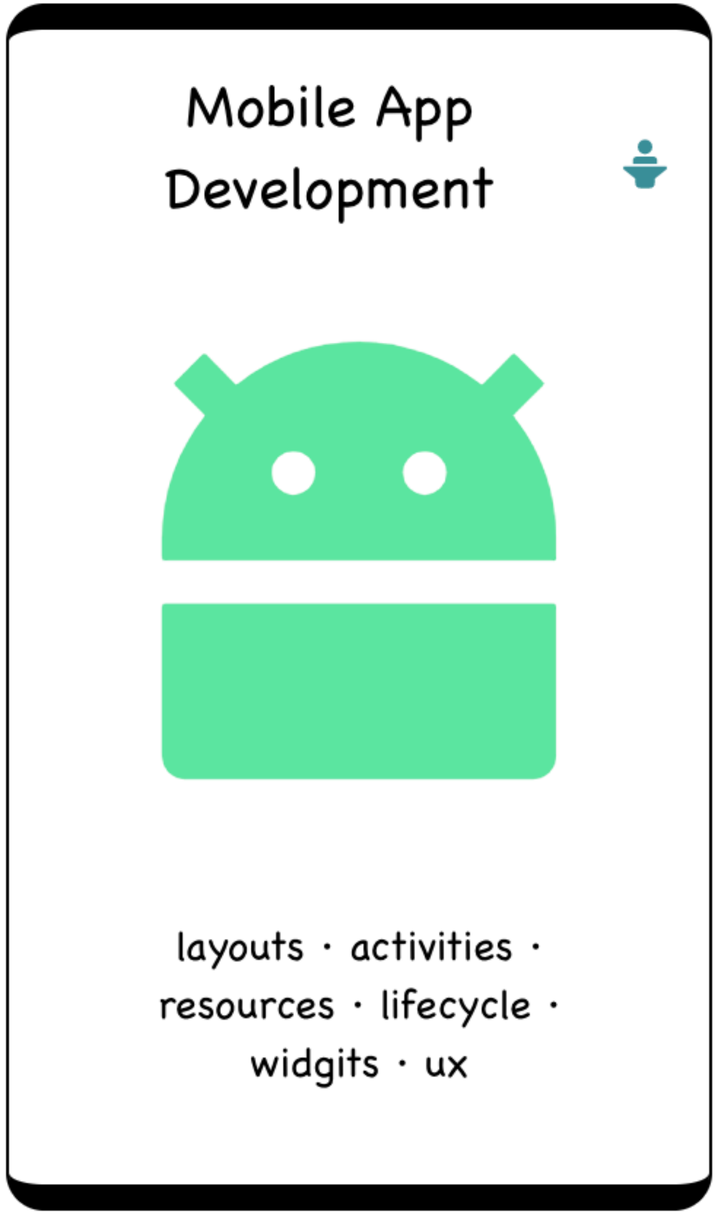
- Introduce React + Storybook
- Explore the React component model
- Understand component navigation, lifecycle & routing
- Review the react methodology
- Select appropriate state management strategies & components





- Build, configure and manage essential network infrastructure services.
- Build, configure and manage essential application services.
- Deploy a network monitoring solution.
- Develop scripts to assist in the management and automation of modern network services.
- Configure appropriate security mechanisms, including firewall rules, encrypted services, and authentication.





- Decompose an application into its constituent parts, including but not limited to: core application components, user experience resources, packaging.
- Design a coherent User Experience - using appropriate tools, practices and guidelines - for a moderately sized application. Produce a medium sized application, based on a limited set of design patterns.
- Manage the application lifecycle. Structure persistent storage on a device and reliably save and restore application state.
- Select the appropriate design patterns and tools in the development of complex mobile apps.
- Comment on the chosen mobile app framework and the underlying hardware components.
- Design and develop complex multi-screen mobile apps from concept through to completion using best practices and guidelines.
- Set up the interaction of an application with internal sensors and physical subsystems.
- Integrate a remote service API within an application, perhaps based on REST principles, to deliver aspects of its core features set.



- Demonstrate specific security problems that can arise with web applications and how to address them.
- Compare and contrast alternative approaches to authentication in both enterprise and consumer-oriented
- web applications.
- Use a selection of best security practices in a web application.

GnuPG

OWASP
Open Web Application Security Project

OpenSSL
Cryptography and SSL/TLS Toolkit

OAUTH

Opportunities for Further Study

- The development team are closely involved in the delivery of two potential follow-on graduate programmes:
  - MSc in Enterprise Software Systems
- These are mature courses, closely aligned with research at TSSG, with substantial enrolments in part-time mode from industry practitioners in the region.
- Successful candidates could continue their academic development in part-time or full-time capacity.

Programming

algorithms · data structures · processing · java · classes · libraries

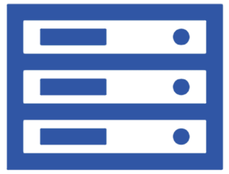
Web Developmen

html · css · layout
apps · web framev
deployment

Web Developm

Javascript · node
· git · github

Full Stack Web Development 1



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Front-End

Full Stack Web Development 2

typescript · SPA ·
APIs · front-e

Computer Systems & Networks

logic · computer organisation · os · networks · interfaces · sensors

Mobile App Development

layouts · activities · resources · lifecycle · widgits · ux

Project & Placement

CV Preparation · placement · project handbook · showcases · samples

Servers

Database

entities · tables · rows · sql · er · nosql

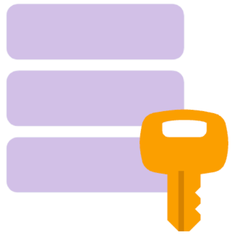
Databases

DevOps

Developer Operations

cloud computing · scripting · scaling · automation · monitoring

Software Security & Forensics



security · crypto · threats · vulnerabilities · file systems · Operating Systems