2024 / 25

School of Science and Computing
+353 (0)51 302037
Eleanor.Reade@setu.ie
www.wit.ie/schools/science_computing

Ollscoil Teicneolaíochta an Oirdheiscirt

South East Technological University

Module Descriptor

Distributed Systems (Computing and Mathematics)

Distributed Systems (A13725)

Short Title: Distributed Systems
Department: Computing and Mathematics
Credits: 5 **Level:** Advanced

Description of Module / Aims

This module will equip the student with the knowledge required to comprehend the architecture of a modern, distributed, service-oriented application and the skills to develop same for a constrained set of requirements. The non-functional requirements of a cloud-native application, namely, resilience, fault tolerance and responsiveness will be considered using a mixture of patterns, libraries and middleware technology. The student will gain experience in deploying to a lightweight container-based cloud platform and have the skills to configure an appropriate load balancing strategy.

Programmes

		stage/semester/status
COMP-0614	BSc (Hons) in Applied Computing (International) (WD_KACCM_BI)	4 / 7 / E
COMP-0562	BSc (Hons) in Applied Computing (WD_KACCM_B)	4 / 7 / M
COMP-0562	BSc (Hons) in Applied Computing (WD_KCOMP_B)	4 / 7 / M
COMP-0562	BSc (Hons) in Computer Forensics and Security (WD_KCOFO_B)	4 / 7 / M
COMP-0562	BSc (Hons) in Computer Science (WD_KCMSC_B)	4 / 7 / M
COMP-0614	BSc (Hons) in Software Engineering (WD_KDEVP_BI)	4 / 8 / M
COMP-0614	BSc (Hons) in Software Systems Development (WD_KCSDV_B)	4 / 2 / M
COMP-0614	BSc (Hons) in Software Systems Development (WD_KDEVP_B)	4 / 8 / E
COMP-0614	BSc (Hons) in Software Systems Practice (WD_KSOFP_B)	1 / 2 / M

Indicative Content

- Fundamentals: Interprocess communication; Promises; Non-blocking I/O, Thread pooling
- Application architecture: Layered; Microservice
- Middleware services: Messaging; Caching
- Application Resilience: Availability; Stability patterns
- Failure isoation and recovery
- Containerization
- Reactive communication first principles

Learning Outcomes

On successful completion of this module, a student will be able to:

1. Design, develop and deploy a scalable, distributed application for a constrained requirements set.
2. Choose appropriate middle-ware technology to improve responsiveness.
3. Maximize an application's resilience and fault tolerance utilizing core patterns and practices.
4. Evaluate and configure an appropriate load balance strategy.
5. Choose and configure an appropriate workflow automation tool suite.

Learning and Teaching Methods

- Combination of lectures and computer-based practicals.
- The lectures will cover the theory and supporting technologies behind distributed systems development.
- The lab-based practicals, building on the theoretical knowledge from lectures, provide exposure to the frameworks, tools and practical skills required to develop and build distributed systems.
- The practical content will use industry standard technologies, tools and techniques.
- Student will be encouraged to enhance their lab work and assessment submissions using self-directed research and learning into the state-of-the-art for distributed systems development.

Learning Modes

Learning Type	F/T Hours	P/T Hours
Lecture	24	
Lab	24	
Independent Learning	87	

Assessment Methods

	Weighting	Outcomes Assessed
Continuous Assessment	100%	
Project	70%	1,2,3
Practical	30%	4,5

Assessment Criteria

<40%: Unable to interpret and apply key concepts of Distributed Systems architecture.

40%–49%: Be able to interpret and apply key concepts of of Distributed Systems architecture.

50%–59%: Ability to demonstrate compatancy in the tool suite and the ability to develop and delpy small-scale solutions.

60%–69%: Presents implemented solutions to medium-sized problems that demonstrate a good understanding of the main patterns and practices of Distributed Systems design.

70%–100%: All of the above to a excellent standard.

Supplementary Material(s)

- Newman, S. *Building Microservices - Designing Fine-Grained Systems*. O'Reilly Media: O'Reilly Media, 2014.

Requested Resources

- Computer Lab: BYOD Lab