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KNCF – Native and Cross-platform Framework in Mobile Application Development

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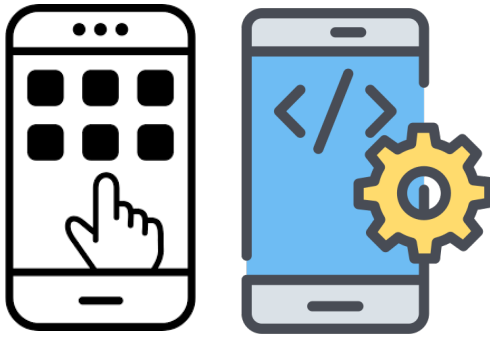
2nd Oct. 2024



1. Amir Rizaan Rahiman

1

Experince

20 years (since 2004)

2

Current position

- Senior Lecturer
- Head of Mobility Unit, (FCSiT), UPM
- Malaysia Qualification Agency (MQA) – Assessor Panel

3

Research interests

Multimedia Applications, Semiconductor Storage Systems, Mobile Computing, Software Engineering (Requirement Engineering), **Fog Computing**

4

App development

- Java 2 Micro Edition (J2ME) – Native
- Android Development Tools (ADT) – Native
- Android Studio – Native
- **Flutter** – Cross platform

2. Introduction

- **NATIVE** and **CROSS-PLATFORM** – **TWO** distinct approaches in mobile app development
  i. **NATIVE** – Create a separate app for each **target platform** (e.g., iOS, Android) using respective programming languages and development environments
  ii. **CROSS-PLATFORM** – Allows developers to build mobile apps that run on **multiple platforms** (e.g., iOS and Android) using a **single codebase**

- **BOTH** approaches have their **STRENGTHS**
  - Decision should be made based on a careful **ASSESSMENT** to ensure the best outcome for the mobile app development project

3. Course Synopsis

- This course:
  - Covers the **concept**, **architecture**, **framework**, **interface design**, **technique**, and **methodology** of mobile application development
  - Emphasizes the successful **practice** in developing an application for the current mobile business **market** using **native** and **cross-platform** mobile application development solutions
  - **Practical session**, students will use the **Flutter** SDK framework to learn how to design and develop a range of mobile applications

4. Learning Activities

i. Encourage students **ACTIVELY** participate in ***coding exercises***, ***design rules*** and ***practical assignments*** to reinforce the theoretical knowledge

ii. Foster **TEAMWORK** through group project – students can learn from each other's ***strengths*** and ***perspectives***

iii. Provide constructive **FEEDBACK** on students' work – encourage reflection on their ***learning*** experiences and challenges faced

5. Teaching Strategies

i. Ensure **TEACHING** align with ***learning outcomes*** and ***course syllabus*** to reinforce essential concepts and skills

ii. Encourage student **PARTICIPATION** through ***discussions***, ***hands-on activities***, and ***collaborative*** projects – deepen understanding and engagement

iii. **INTEGRATE** current industry ***practices***, ***tools***, and ***technologies*** into teaching activities – prepare students for evolving demands in mobile app development

6. Learning Objectives: Professional Competence

i. Compare suitable **TOOLS**, **FRAMEWORK**, **DESIGN**, and **ARCHITECTURE** for **NATIVE** and **CROSS-PLATFORM** mobile application development (2)
ii. Design and develop a real mobile **APPLICATION** using an appropriate development framework as a team (3)
iii. Deploy the application to the **MARKETPLACE** for digital distribution (3)

– know, 2 – can, 3 – understand and apply

7. Learning Objectives: Personal Competence

i. Gain competence the **CONCEPT**, **ARCHITECTURE**, **FRAMEWORK**, **INTERFACE** design, **TECHNIQUE**, and **METHODOLOGY** of mobile application development (3)

ii. Proficient the successful practice in developing an application for the current mobile **BUSINESS MARKET** by using the recent **CROSS-PLATFORM** mobile application development solutions (3)

iii. Efficient and skillful to use the **Flutter** SDK framework in designing and developing a range of mobile applications (3)

1 – know, 2 – can, 3 – understand and apply

8. Teaching Form

- **Blended learning:**
  - **i. Face-to-Face class (~26 hours) – 63%**
    - Lecture
    - Lab exercises
  - **ii. Online lecture (10 sessions, 1.5 hours/session, 15 hours) – 37%**
    - Lecture
    - Lab exercises
    - Group project

9. Examination Performance

i. Lab exercises – 20%

- Topic 1 – 3 – October/November 2024 **[10%]**
- Dart Programming – October/November 2024 **[10%]**

ii. Assignments – 40%

- Layout Design – November 2024 **[10%]**
- `UserAccountDrawerHeader` – November 2024 **[10%]**
- Interface design/Front End – November 2024 **[20%]**

iii. Group project – 40%

- Proposal – December 2024 **[10%]**
- Presentation – January 2025 **[30%]**

10.Course contents

- **LECT_1:** Mobile application ecosystems
- **LECT_2:** Mobile application development
- **LECT_3:** Dart programming
- **LECT_4:** Laying out widgets
- **LECT_5:** Standard library – Plugins and packages
- **LECT_6:** Network, storage I/O and navigation
- **LECT_7:** Database in mobile application
- **LECT_8:** Testing and debugging
- **LECT_9:** Application deployment

11.Lab

LAB_1: Native application development framework configuration

LAB_2: Application on hardware devices

LAB_3: Layout and Graphical user interface (GUI) – Frontend development

LAB_4: Database application – Backend development

LAB_5: Built-in packages and plugins

LAB_6: Custom-made Package development – AI packages

LAB_7: Application distribution

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12.Tools and Softwares

Programming **SKILLS**	▪ Dart, C++, Java, XML, JSON, Php
SOFTWARE tools	▪ Flutter SDK ▪ Dart SDK
IDE (Integrated Development Environment)	▪ Write, compile, debug, and monitor resources ▪ VS code – Version 1.79 ▪ Android Studio – Version 4

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13. Lecture Schedule

DATE	TIME (CET)		DAY	DURATION	SESSION	TOTAL HOURS	MODE	%
	Start	End						
2/10/24	15:30	17:00	WED	1:30	OL_1	7:30	Online	18.5%
9/10/24					OL_2			
16/10/24					OL_3			
23/10/24					OL_4			
30/10/24					OL_5			
6/11/24	15:30	18:45	WED	3:00	PL_1 (K222)	25:15	Physical	~63
8/11/24	10:00	13:15	FRI	3:15	PL_2 (K222)			
13/11/24	15:30	18:45	WED	3:00	PL_3 (K222)			
15/11/24	10:00	13:15	FRI	3:15	PL_4 (K139)			
20/11/24	15:30	20:30	WED	4:45	PL_5 (K222)			
22/11/24	10:00	13:15	FRI	3:15	PL_6 (K007)			
27/11/24	15:30	20:30	WED	4:45	PL_7 (K222)			
4/12/24	15:30	17:00	WED	1:30	OL_6	7:30	Online	18.5%
11/12/24					OL_7			
18/12/24					OL_8			
8/01/25					OL_9			
15/01/25					OL_10			

Source: WebUntis

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13.1 Links ...

Session	Links
OL_1	Wednesday, October 2, 21:30 – 23:00 (CET: 15:30 – 17:00) Time zone: Asia/Kuala Lumpur Video call link: https://meet.google.com/tig-pnkj-ttt
OL_2	Wednesday, October 9, 21:30 – 23:00 (CET: 15:30 – 17:00) Time zone: Asia/Kuala Lumpur Video call link: https://meet.google.com/pzv-awxh-vpc
OL_3	Wednesday, October 16, 21:30 – 23:00 (CET: 15:30 – 17:00) Time zone: Asia/Kuala Lumpur Video call link: https://meet.google.com/var-wsys-azw
OL_4	Wednesday, October 23, 21:30 – 23:00 (CET: 15:30 – 17:00) Time zone: Asia/Kuala Lumpur Video call link: https://meet.google.com/wfv-gtrw-gfw
OL_5	Wednesday, October 30, 22:30 – 0:00 (CET: 15:30 – 17:00) Time zone: Asia/Kuala Lumpur Video call link: https://meet.google.com/uks-hfcd-hzv

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13.1 Links ...

Session	Links
OL_6	Wednesday, December 4, 22:30 – 0:00 (CET: 15:30 – 17:00) Time zone: Asia/Kuala Lumpur Video call link: https://meet.google.com/nha-hpjg-cth
OL_7	Wednesday, December 11, 22:30 – 0:00 (CET: 15:30 – 17:00) Time zone: Asia/Kuala Lumpur Video call link: https://meet.google.com/xar-aqir-ftf
OL_8	Wednesday, December 18, 22:30 – 0:00 (CET: 15:30 – 17:00) Time zone: Asia/Kuala Lumpur Video call link: https://meet.google.com/dax-wias-pfz
OL_9 (2025)	Wednesday, January 8, 22:30 – 0:00 (CET: 15:30 – 17:00) Time zone: Asia/Kuala Lumpur Video call link: https://meet.google.com/vom-uyqi-edq
OL_10 (2025)	Wednesday, January 15, 22:30 - 0:00 (CET: 15:30 – 17:00) Time zone: Asia/Kuala Lumpur Video call link: https://meet.google.com/wpu-tfzp-dfr

References

i. **Carmine, Z. (2020). Programming Flutter: Native, Cross-Platform Apps the E asy Way. The Pragmatic Programmer.**

ii. P. Nawrocki, K. Wrona, M. Marczak, and B. Sniezynski. A Comparison of Native and CrossPlatform Frameworks for Mobile Applications. Computer, 54(3), 18-2 7 (2021)

iii. D. Inupakutika, S. Kaghyan, D. Akopian, P. Chalela, and A.G. Ramirez. Facilitati ng the development of cross-platform mHealth applications for chronic support ive care and a case study. Journal of biomedical informatics, 105, p.103420 (2 020).

iv. A. Biørn-Hansen, C. Rieger, T. M. Grønli, T. A. Majchrzak, and G. Ghinea, An em pirical investigation of performance overhead in crossplatform mobile develop ment frameworks. Empirical Software Engineering, 25, pp.2997-3040 (2020)