

**THE NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND
TRAINING**



OCCUPATIONAL STANDARDS

OCCUPATION: MOBILE APPLICATION DEVELOPMENT ENGINEER

LEVEL: NTA LEVEL 7

FEBRUARY 2024

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ABBREVIATIONS

AAC	Android Architecture Components
API	Application Programming Interface
CBET	Competency Based Education and Training
HTTPS	Hypertext Transfer Protocol Secure
ICB	IPMA Individual Competence Baseline
MSA	Microservices Architecture
MVC	Model-View-Controller Software Design Pattern
MVVM	Model-View-ViewModel Software Design Pattern
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OAuth	Open Authorization
ORM	Object-Relational Mapping
OS	Occupational Standards
PRINCE2	Projects IN Controlled Environments
SOA	Service-Oriented Architecture
SDD	Software Detailed Design
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training
UI	User Interface
WBS	Work Breakdown Structure

GLOSSARY OF TERMS

Circumstantial knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues.
Competence:	The ability to use knowledge, understanding, practical, and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based Education:	An instructional programme that derives its content from validated tasks and bases assessment on the learner's performance.
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/Training Programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational Area:	This is a broad grouping of related jobs. (Example: food service)
Occupational Competence:	The application of knowledge and skills that consistently meet the standards required by the work context.
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as a performance tool of assessment of the prescribed outcomes.
Occupational/Job Analysis:	A process used to identify the tasks that are important to employees in any given occupation.
Performance Criteria:	Indicate expected end results or outcomes in the form of evaluative statements.

Skills:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as a composite of three completely interdependent components: cognitive, affective, and psychomotor.
Standards:	A set of statements, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance.
Task Analysis:	The process of analysing each task to determine the steps, circumstantial knowledge, attitudes, performance standards, tools and materials needed, as well as safety concerns required for the employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, and consists of two or more definite steps that leads to a product, service, or decision.
Underpinning Knowledge:	Crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification Process:	The process of having experts review and confirm the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.

1.0. INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's *Development Vision 2025* intends to raise the country's economy to a middle-income status, with a high level of human development. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical and Vocational Education and Training (NACTVET) has begun the job of drafting Occupational Standards (OS) that will eventually be adopted as National Occupational Standards (NOS) for use in the delivery of TET that meets the needs of the labour market and the country's economic agenda.

Occupational Standards (OS) are performance criteria that are matched with labour market demands. Each of them describes the functions, performance standards, and understanding or knowledge underpinning a given occupation. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruitment, supervision, and appraisal, as well as TET Standards. They are also helpful for benchmarking and harmonizing job qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current, and consistent in application across all public and private institutions.

However, it must be noted that Occupational Standards are different from Training /Education Standards. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical circuits, performs troubleshooting in electrical circuits, etc.), and are usually defined by Employers following procedures as agreed upon by all the stakeholders. On the other hand, Training and Education Standards are developed from the activities defined in the occupational standards, and they specify learning objectives to ensure that the necessary skills and knowledge are developed by a person to enable him/her to function at an agreed level in an occupation. Training and Education Standards are used to define curricula in training institutions. It is critical, however, to establish a direct link between the occupational standards and the training standards for both of them to respond collaboratively to the demands of the labour market.

For the purpose of TET delivery, Tanzania has adopted the Competence Based Education and Training (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational standards are thus the starting point for developing competency-based training (CBET) programmes. Therefore, it is quite pertinent for TET institutions to use the relevant occupational standards as a benchmark for formulating their curricula.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training.

The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The process of developing these Occupational Standards involved both local and international expertise. The process began with an examination of major documents that guide Tanzanian skills development including the *10-year National Skills Development Strategy (2016-2026)*. NACTVET labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a team of experts in consultation with practitioners developed draft occupational standards. The draft document was used to develop an occupational profile for each occupation (DACUM Chart), which is attached as an **Appendix** to every Occupational Standard.

The occupational standards were validated during the stakeholders' forum held on 22nd and 23rd February 2024 at Morogoro. The information from the stakeholders' forum provides insight from the workplace, professional bodies, regulatory bodies and sector ministries regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR MOBILE APPLICATION DEVELOPMENT ENGINEERS

These standards cover a broad range of duties and tasks that can be performed by a Mobile Application Development Engineer. However, the occupational standards are not meant to replace individual job descriptions. Instead, they are to be used for guidance in defining skill levels and

knowledge for the technician in specific settings or positions. The Mobile Application Development Engineer may perform tasks in a number of key areas of the Occupational Standards, but not necessarily in all areas. For example, in large operations, other individuals may be employed or designated to perform specific tasks.

The Mobile Application Development Engineer is responsible for designing the distributed service architecture, implementing the distributed server configuration, analysing and solving server faults, maintaining system security, and optimizing database performance. They also undertake the system design task, complete the application-to-microservice development and optimization according to the microservices architecture, take charge of comprehensive management of projects, and manage the project scope, quality and information documents in a standard and uniform way. Generally, the Mobile Application Development Engineer performs the following responsibilities:

- a) Project requirement planning
- b) System design
- c) Mobile application project development
- d) Project system testing
- e) Project implementation and maintenance
- f) Distributed server environment maintenance and optimization
- g) Software system design
- h) Microservices development and optimization
- i) Comprehensive project management

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA LEVEL 7 and 8.

4.0. VALIDITY PERIOD

Due to the rapid development of technology, the validity period of occupational standards is 3-5 years. The review will proceed in the same manner as the one before it, with new occupational standards being developed based on current trends of the labour market.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR MOBILE APPLICATION DEVELOPMENT

ENGINEER - NTA LEVEL 7

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	PLAN PROJECT REQUIREMENTS	DUTY NO.	701
TASK TITLE	SURVEY PROJECT REQUIREMENTS	TASK NO.	7011
PERFORMAN CE CRITERIA	The person performing this task must be able to organize project requirement surveys and write survey reports in accordance with the overall situation of projects and survey specifications.		
RANGE STATEMENT	The task can be performed in the meeting room or other survey places under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Text editor software; 2. Computers; 3. Commonly-used operating systems, such as Windows, Mac and Linux; 4. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Prepare survey tools, including survey templates, survey forms, requirement survey questions and interview recording tools; 2. Formulate survey plans and allocate survey resources; 3. Survey customer service requirements and clarify systematic services and service flows;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Complete project requirement surveys using the methods of interview, inquiry, observation, experiment, personal interview, telephone survey, network survey and email survey; 1.2 Summarize survey data using the methods of comparative analysis of indicators, analysis of data grouping, time series and dynamic analysis;	

4. Survey system user requirements and clarify user categories and features; 5. Survey non-functional requirements, including system security, expandability and other requirements and design constraints; 6. Collate survey data and summarize survey results; 7. Write requirement survey reports; 8. Observe health, occupational and environmental safety rules and regulations.	1.3 Write survey reports using the methods of cross-cutting survey and straight-through survey. 2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Requirements for communication with customers during the survey; 2.2 Confidentiality principles during the survey; 2.3 Survey report writing norms. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Concepts of the user requirement survey; 3.2 Process of the user requirement survey; 3.3 Composition of user requirement survey staff; 3.4 Precautions for the user requirement survey; 3.5 Software engineering development specifications. 4.0 Essential Skills 4.1 Communication skills; 4.2 Analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills. 5.0 Math Skills 5.1 Calculation skills; 5.2 Statistical skills.
DESCRIPTION OF THE END	Requirement surveys are carried out and survey reports

PRODUCT / SERVICE	are written in accordance with the overall situation of projects and survey specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	PLAN PROJECT REQUIREMENTS	DUTY NO.	701
TASK TITLE	ANALYSE PROJECT REQUIREMENTS	TASK NO.	7012
PERFORMAN CE CRITERIA	The person performing this task must be able to analyse requirements in accordance with the overall situation of projects and requirement analysis specifications.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Data dictionary generation tools; 2. Mapping software; 3. Computers; 4. Commonly-used operating systems, such as Windows, Mac and Linux; 5. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Analyse the results of customer service requirement surveys, analyse service flows and draw service flow diagrams; 2. Analyse the results of system user requirement surveys, analyse user objects and draw system use case diagrams; 3. 3. Analyse system data, create data dictionaries and draw data flow		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Draw service flow diagrams using the drawing method; 1.2 Create data dictionaries using glossaries; 1.3 Analyse project requirements using the methods of requirement classification, requirement value judgement and requirement priority definition. 2.0 Principles	

diagrams; 4. Analyse the results of non-functional requirement surveys, analyse the factors affecting system quality, and guarantee the system to continue to provide services stably and efficiently; 5. Observe health, occupational and environmental safety rules and regulations.	The person performing this task must be able to explain the following principles: 2.1 Regulations on requirement reasonableness; 2.2 Principle of requirement consistency; 2.3 Principle of analysis integrity ; 2.4 Principle of system operability; 2.5 Principle of system expandability. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Tasks related to requirement analyses; 3.2 Task flows of requirement analyses. 4.0 Essential Skills 4.1 Communication skills; 4.2 Analysis skills; 4.3 Teamwork skills. 5.0 Math Skills 5.1 Calculation skills; 5.2 Statistical skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Requirements are analysed in accordance with the overall situation of projects and requirement analysis specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	PLAN PROJECT REQUIREMENTS	DUTY NO.	701
TASK TITLE	WRITE PROJECT REQUIREMENTS STATEMENT	TASK NO.	7013
PERFORMANCE CRITERIA	The person performing this task must be able to formulate project requirement statements in accordance with requirement analysis results and writing norms.		
RANGE STATEMENT	The task can be performed in the meeting room or other survey places under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Text editor software; 2. Computers; 3. Commonly-used operating systems, such as Windows, Mac and Linux; 4. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Write the introduction in accordance with project requirements and statement writing norms, including the contents of system development purposes, applicable scope, references and relative terms; 2. Write the requirement overview, including the contents of objectives, operating environments, user features and constraints;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Organize the architecture of the requirement statement; 1.2 Establish the requirement statement directory structure and complete the writing of the project requirement statement; 1.3 Write the requirement statement using the requirement structure visualization method.	

3. Write functional requirements in accordance with analysis results and specifications, including the contents of system functions, service flows and data requirements; 4. Write non-functional requirements in accordance with analysis results and specifications, including the contents of system performance requirements, adaptability requirements, confidentiality requirements, resource requirements, software quality factors, design and implementation constraints; 5. Observe health, occupational and environmental safety rules and regulations.	2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Project requirement statement writing specifications; 2.2 Principle of requirement clarity; 2.3 Principle of requirement accuracy. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Main elements of project requirement statements; 3.2 Process of project requirement statement preparation; 3.3 Precautions for project requirement statement preparation. 4.0 Essential Skills 4.1 Communication skills; 4.2 Analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Project requirement statements are formulated in accordance with requirement analysis results and statement specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

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OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	DESIGN SYSTEM	DUTY NO.	702
TASK TITLE	DESIGN SYSTEM STRUCTURE	TASK NO.	7021
PERFORMANCE CRITERIA	The person performing this task must be able to design and document software system structures in accordance with system requirement specification instructions.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Text editor software; 2. Diagramming tool software; 3. Computers; 4. Commonly-used operating systems, such as Windows, Mac and Linux; 5. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Design the system's top-level framework, including the system's level interface and module interface; 2. Design the top-level framework of the system's external interface, and the top-level framework of each inter-module interface in the system; 3. Design the database's top-level		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Create system structures using the object-oriented method; 1.2 Design system framework structures using the drawing method; 1.3 Divide system hierarchies using the layering method; 1.4 Split system function modules using the modular method; 1.5 Design system models using the IDEF method.	

framework, including data structure, data relationship and data flow; 4. Divide system function modules; 5. Write system structure design documents; 6. Observe health, occupational and environmental safety rules and regulations.	2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Principle of consistency between requirements and design; 2.2 Principle of structured design; 2.3 Principle of design feasibility; 2.4 Principles of system operation and maintenance feasibility; 2.5 Software engineering specifications. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Concept of the system structure; 3.2 Concept of the system function modularization; 3.3 Concept of the function module abstraction; 3.4 Concept of the inter-module information shielding; 3.5 Concept of the function module independence. 4.0 Essential Skills 4.1 Communication skills; 4.2 Analysis skills; 4.3 Document writing skills; 4.4 Teamwork skills. 5.0 Math Skills 5.1 Operation skills.
DESCRIPTION OF THE END	Software system structures are designed and documented

PRODUCT / SERVICE	in accordance with system requirement specification instructions.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	DESIGN SYSTEM	DUTY NO.	702
TASK TITLE	DESIGN SYSTEM DATA STRUCTURE	TASK NO.	7022
PERFORMANCE CRITERIA	The person performing this task must be able to carry out and document detailed designs of databases in accordance with the top-level design of data and technical requirements.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Text editor software; 2. Diagramming tool software; 3. Computers; 4. Commonly-used operating systems, such as Windows, Mac and Linux; 5. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Design the data's conceptual structure, including data entity, data relationship and data constraint design; 2. Design the data model, define the required data structure and data relationship in accordance with system service requirements, and draw E-R diagram and UML class diagram; 3. Optimize the data model, including checking data definition specifications		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Design the system data's conceptual structure using the top-down approach; 1.2 Design the data's logical relationship model using the entity relationship approach; 1.3 Define the system data type using the abstraction approach; 1.4 Design the data model's internal relationship using the view integration approach.	

and adding indexes; 4. Design the data access interface, including data access mode, data reading, updating and deleting; 5. Design the system data's physical structure, including the data document organization mode, data table storage mode, data index design, database security mechanism, data backup and recovery mechanisms; 6. Observe health, occupational and environmental safety rules and regulations.	2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Principle of data integrity; 2.2 Principle of data consistency; 2.3 Principle of data security; 2.4 Principle of data scalability; 2.5 Principle of data expandability; 2.6 Principle of data design normalization; 2.7 Software engineering specifications. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Requirements for entity relationship modelling; 3.2 Requirements of the New Orleans method; 3.3 Precautions for 3NF relational mode; 3.4 Data structure design steps; 3.5 Data model classification methods; 3.6 Relational data languages. 4.0 Essential Skills 4.1 Communication skills; 4.2 Analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills. 5.0 Math Skills 5.1 Operation skills.
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DESCRIPTION OF THE END PRODUCT / SERVICE	Detailed designs of databases are carried out and documented in accordance with the top-level design of data and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	DESIGN SYSTEM	DUTY NO.	702
TASK TITLE	DESIGN SYSTEM INTERFACE	TASK NO.	7023
PERFORMANCE CRITERIA	The person performing this task must be able to design the system's external interfaces and internal inter-module interfaces, and document the system interface designs.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Text editor software; 2. Diagramming tool software; 3. Computers; 4. Commonly-used operating systems, such as Windows, Mac and Linux; 5. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Define interface types, including software interface, hardware interface and network interface; 2. Describe interface functions, including definition of methods and attributes, polymorphism implementation and constraint inheritance; 3. Design interface inputs/outputs, including clarification of input/output parameter definitions, verification of		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Design interfaces using the normalization method; 1.2 Describe interface features using the identification method; 1.3 Define interfaces using the factory method; 1.4 Describe interface functions using the drawing method.	

parameter validity, design of return values, and exception handling; 4. Design interface calling methods, including clarification of interface functions, definition of method names, method parameters and return values, and creation of error handling mechanisms; 5. Design interface error handling, including definition of error types, error descriptions, error message return formats and log recording of error messages; 6. Observe health, occupational and environmental safety rules and regulations.	2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Single responsibility principle of interfaces; 2.2 Interface segregation principle; 2.3 High cohesion and low coupling principles; 2.4 Principle of unified parameter formats; 2.5 Principle of normative interface name definitions; 2.6 Principles of interface comprehensiveness, security, reliability and maintainability; 2.7 Liskov substitution principle; 2.8 Interface dependency inversion principle; 2.9 Law of Demeter; 2.10 Software engineering specifications. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Precautions for interface IUID; 3.2 Interface type standards; 3.3 Interface priority standards; 3.4 Data element aggregation features; 3.5 Interface communication methods; 3.6 Interface protocol features. 4.0 Essential Skills 4.1 Communication skills; 4.2 Analysis skills; 4.3 Report writing skills;
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	4.4 Teamwork skills. 5.0 Math Skills 5.1 Operation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Interface design is carried out and documented in accordance with data and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	DESIGN SYSTEM	DUTY NO.	702
TASK TITLE	DESIGN SYSTEM MODULE	TASK NO.	7024
PERFORMANCE CRITERIA	The person performing this task must be able to design functional specifications of modules and inter-module association logics in accordance with system requirement specification instructions.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Text editor software; 2. Diagramming tool software; 3. Computers; 4. Commonly-used operating systems, such as Windows, Mac and Linux; 5. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE		
The person performing this task must be able to do the following: 1. Design system module functions; 2. Design inter-module logical relationships; 3. Design module inputs and outputs; 4. Design class structures of	Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Design system module functions using the normalization method; 1.2 Design system modules' logical relationships using the drawing method; 1.3 Design modules internal structures using the abstraction approach. 2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Module independence principle;		

modules; 5. Design thread structures of modules; 6. Design data formats of modules; 7. Design execution processes of modules; 8. Design extended functions of modules; 9. Observe health, occupational and environmental safety rules and regulations.	2.2 Principle of single functional responsibility; 2.3 Principle of streamlined structures; 2.4 High cohesion and low coupling principles; 2.5 Software engineering specifications; 2.6 Law of Demeter. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Modular design theories; 3.2 Object-oriented design theories; 3.3 Theories of software design patterns; 3.4 Concept of coupling; 3.5 Concept of cohesion; 3.6 Concept of structuralizing. 4.0 Essential Skills 4.1 Communication skills; 4.2 Functional requirement analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills. 5.0 Math Skills 5.1 Operation skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Functional specifications of modules are designed in accordance with system requirement specification instructions.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	DESIGN SYSTEM	DUTY NO.	702
TASK TITLE	DESIGN SYSTEM INTERACTION	TASK NO.	7025
PERFORMANCE CRITERIA	The person performing this task must be able to complete the system interaction design, document such design and create the system interaction interface.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Text editor software; 2. Diagramming tool software; 3. Interface design tool software; 4. Computers; 5. Commonly-used operating systems, such as Windows, Mac and Linux; 6. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Define the system interaction form, and make comprehensive consideration based on the participant roles, interaction mode and interaction contents; 2. Design the system interaction inputs and outputs, including the design of input/output data and input/output state;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Determine the system interaction form using the case analysis method; 1.2 Design the system interaction using the goal-oriented design method; 1.3 Design the system interaction process using the drawing method;	

3. Design the system interaction mode, establish the system interaction model and determine the interaction mode by determining the system interaction goal; 4. Design the system interaction function, including the structural and logic designs of interaction function; 5. Design the system interaction process, including the design of user inputs, system processing, data storage and interaction feedback; 6. Observe health, occupational and environmental safety rules and regulations.	1.4 Design the system interaction function using the modelling method. 2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Principle of consistency between system function and interaction; 2.2 Principle of enlightening system interaction; 2.3 Principle of fault-tolerant system interaction; 2.4 Principle of simple and convenient system interaction. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Process of the user interface modelling; 3.2 Process of the graphical interface design; 3.3 Concept of the human-machine interaction; 3.4 Concept of the human-machine interface. 4.0 Essential Skills 4.1 Communication skills; 4.2 Analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	System interaction is designed and system interaction interface is created in accordance with system requirements and technical requirements.

CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.
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OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	DEVELOP MOBILE APPLICATION PROJECT	DUTY NO.	703
TASK TITLE	DEVELOP ADVANCED FUNCTIONS OF MOBILE APPLICATIONS	TASK NO.	7031
PERFORMAN CE CRITERIA	The person performing this task must be able to develop advanced functions of mobile application projects.		
RANGE STATEMENT	The task can be performed in the office space with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Design geo-location and navigation functions for mobile devices; 2. Use mobile devices to play, record and process audio/video documents; 3. Use built-in sensors of mobile devices to develop corresponding functions; 4. Use WebView to load webpages, and		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Call the interfaces of built-in sensors to write program codes; 1.2 Create and process multimedia objects; 1.3 Use WebView class and implement JS interaction; 1.4 Create desktop components.	

implement interaction and calling to JavaScript; 5. Create and manage desktop components, and add event interactions of desktop components; 6. Observe health, occupational and environmental safety rules and regulations.	2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Multimedia class development principles; 2.2 Sensor class development principles; 2.3 WebView class working principles; 2.4 Mobile application project performance standards; 2.5 Mobile application project security and privacy requirements. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Methods to edit and process images; 3.2 Methods to capture, synthesize, process and play audio/video documents; 3.3 Methods to transmit, distribute and intercept touch events; 3.4 WebView component development techniques; 3.5 Concurrent programming methods; 3.6 Desktop component management methods. 4.0 Essential Skills 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Teamwork skills. 5.0 Math Skills 5.1 Operation skills; 5.2 Statistical skills;
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	5.3 Linear algebra.
DESCRIPTION OF THE END PRODUCT / SERVICE	Advanced functions of mobile application projects are developed in accordance with system requirements and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	DEVELOP MOBILE APPLICATION PROJECT	DUTY NO.	703
TASK TITLE	DEVELOP APPLICATION BASED ON STANDARD AND OPEN-SOURCE LIBRARIES	TASK NO.	7032
PERFORMANCE CRITERIA	The person performing this task must be able to develop the application functions using standard and third-party libraries.		
RANGE STATEMENT	The task can be performed in the office space with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Analyse the project service functions; 2. Select an appropriate system expansion library or third-party open source library; 3. Import the third-party open source library or system expansion library; 4. Apply the third-party open source		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Load or import a third-party open source library; 1.2 Load or import a system expansion library; 1.3 Call the functional interface of the third-party open source library; 1.4 Call the functional interface of the system expansion library.	

library or system expansion library; 5. Call the third-party open source library interface to complete program function coding; 6. Use the system expansion library to complete program function coding; 7. Observe health, occupational and environmental safety rules and regulations.	2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Principle of requirement consistency; 2.1 Principle of third-party open source library selection; 2.2 Mobile application project performance standards; 2.3 Mobile application project security and privacy requirements. 3.0 Theories The person performing this task must be able to explain the following: 3.1 AAC architecture standards of mobile applications; 3.2 Annotation frameworks of mobile application projects; 3.3 Network request frameworks of mobile application projects; 3.4 Reactive programming methods; 3.5 Concurrent programming methods. 4.0 Essential Skills 4.1 Communication skills; 4.2 Teamwork skills; 4.3 Computer application skills. 5.0 Math Skills 5.1 Operation skills;
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	5.2 Statistical skills; 5.3 Linear algebra.
DESCRIPTION OF THE END PRODUCT / SERVICE	Application functions are developed using standard and third-party libraries in accordance with system requirements and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	DEVELOP MOBILE APPLICATION PROJECT	DUTY NO.	703
TASK TITLE	ESTABLISH GENERIC CLASS OF PROJECT LIBRARIES	TASK NO.	7033
PERFORMANCE CRITERIA	The person performing this task must be able to establish generic class libraries of projects reasonably.		
RANGE STATEMENT	The task can be performed in the office space with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode 4. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Analyse generic function modules of projects; 2. Write generic module codes of projects; 3. Verify and improve generic module codes of projects; 4. Create common libraries of projects; 5. Fill, improve and modify the functions of common libraries;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Create common libraries of mobile application projects; 3.2 Compile common libraries of mobile application projects; 3.3 Import common libraries of mobile application projects;	

6. Compile common libraries of projects; 7. Import the compiled common libraries; 8. Design, create and modify custom components; 9. Design the functions of custom components; 10. Observe health, occupational and environmental safety rules and regulations.	3.4 Determine the priority of common libraries of projects; 3.5 Compile the source codes of common libraries, and generate library documents; 3.6 Design the methods of custom components. 2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Principle of requirement consistency; 2.2 Design principles of common libraries of mobile application projects; 2.3 Mobile application project performance standards; 2.4 Mobile application project security and privacy requirements. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Resource conflict resolution techniques; 3.2 Function expansion techniques of components; 3.3 Concurrent programming methods. 4.0 Essential Skills 4.1 Communication skills; 4.2 Teamwork skills. 5.0 Math Skills 5.1 Operation skills;
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	5.2 Statistical skills; 5.3 Linear algebra.
DESCRIPTION OF THE END PRODUCT / SERVICE	Generic class libraries of projects are established in accordance with system requirements and technical requirements.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	DEVELOP MOBILE APPLICATION PROJECT	DUTY NO.	703
TASK TITLE	ESTABLISH PROJECT FRAMEWORK	TASK NO.	7034
PERFORMANCE CRITERIA	The person performing this task must be able to establish project frameworks in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the office space with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Safety gear		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE		
The person performing this task must be able to do the following: 1. Select different project design patterns; 2. Separate views, view models and models based on MVVM pattern; 3. Separate views, models and controllers based on MVC	Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Split project function modules; 1.2 Design project architectures based on MVC pattern; 1.3 Design project architectures based on MVVM pattern; 1.4 Import and use common project frameworks; 1.5 Configure, compile and package projects.		

pattern; 4. Configure project runtime environments and add project dependencies; 5. Adopt the hierarchical idea to create project sub-modules and set up project frameworks; 6. Import module dependencies and verify module functions; 7. Encapsulate common functions of projects; 8. Verify overall operation of projects; 9. Observe health, occupational and environmental safety rules and regulations.	2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Principle of requirement consistency; 2.2 Principle of project front- and back-end separation; 2.3 Mobile application project performance standards; 2.4 Mobile application project security and privacy requirements. 3.0 Theories The person performing this task must be able to explain the following: 3.1 MVVM development pattern; 3.2 MVC development pattern; 3.3 Design techniques of front- and back-end separating development models. 4.0 Essential Skills 4.1 Communication skills; 4.2 Teamwork skills. 5.0 Math Skills 5.1 Operation skills; 5.2 Statistical skills; 5.3 Linear algebra.
DESCRIPTION OF THE END PRODUCT / SERVICE	Project frameworks are established in accordance with system requirements and technical specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATIO N CODE	
DUTY TITLE	DEVELOP MOBILE APPLICATION PROJECT	DUTY NO.	703
TASK TITLE	DEVELOP CROSS-PLATFORM MOBILE APPLICATION PROJECT	TASK NO.	7035
PERFORMANCE CRITERIA	The person performing this task must be able to develop cross-platform mobile application projects in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the office space with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Select an applicable cross-platform framework; 2. Design and set up cross-platform static pages; 3. Call components of the cross-platform framework, and implement corresponding functions;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Analyse project requirements, and select a cross-platform framework reasonably; 1.2 Use the cross-platform framework to design UI; 1.3 Use the cross-platform framework to design custom components;	

4. Import generic components of the cross-platform framework or third-party open source plug-ins; 5. Define cross-platform components, and implement the required functions of components; 6. Design and implement cross-platform interaction events; 7. Define cross-platform data interfaces, and complete the interface front- and back-end joint debugging; 8. Configure, package and deploy cross-platform applications; 9. Observe health, occupational and environmental safety rules and regulations.	1.4 Use the cross-platform framework to design cross-platform application interfaces; 1.5 Use the cross-platform framework to implement service functions; 1.6 Solve the problems of cross-platform application packaging, configuration and deployment. 2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Principle of requirement consistency; 2.2 Design principles of cross-platform components; 2.3 Performance standards for cross-platform projects; 2.4 Network communication principles of cross-platform projects; 2.5 Security and privacy requirements for cross-platform projects. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Cross-platform framework working methods; 3.2 Cross-platform network communication protocol standards; 3.3 Communication interface cross-domain methods. 4.0 Essential Skills 4.1 Communication skills; 4.2 Teamwork skills.
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	5.0 Math Skills 5.1 Calculation skills; 5.2 Statistical skills; 5.3 Linear algebra.
DESCRIPTION OF THE END PRODUCT / SERVICE	Cross-platform projects are developed in accordance with technical requirements and service specifications, with source codes and product release documents generated.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	DEVELOP MOBILE APPLICATION PROJECT	DUTY NO.	703
TASK TITLE	DEVELOP SERVER-SIDE PROJECT	TASK NO.	7036
PERFORMANCE CRITERIA	The person performing this task must be able to complete server-side project development in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the office space with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Determine the server hardware performance parameters; 2. Select an applicable server development framework; 3. Configure server parameters; 4. Install and run the server software; 5. Select an applicable database management system; 6. Use the server to associate with the		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Install and configure application server software; 1.2 Install and configure Web server software; 1.3 Use common database management systems to manage back-end data; 1.4 Develop the server project's service functions.	

back-end database; 7. Create a database, design the data table structure, and manage the project data; 8. Select an applicable ORM framework to implement the server's service functions; 9. Observe health, occupational and environmental safety rules and regulations.	2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Principle for server development framework selection; 2.2 Principle for database object relationship mapping; 2.3 Design principles for server project development; 2.4 Performance standards for server project development. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Methods to use common server frameworks; 3.2 Techniques to develop server service functions; 3.3 Database ORM mapping methods; 3.4 Database operation methods; 3.5 Server O&M management standards. 4.0 Essential Skills 4.1 Communication skills; 4.2 Report writing skills; 4.3 Teamwork skills. 5.0 Math Skills 5.1 Calculation skills; 5.2 Statistical skills; 5.3 Mathematical analysis.
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DESCRIPTION OF THE END PRODUCT / SERVICE	Server-side projects are developed in accordance with technical requirements and service specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	TEST PROJECT SYSTEM	DUTY NO.	704
TASK TITLE	SET UP TESTING ENVIRONMENT	TASK NO.	7041
PERFORMANCE CRITERIA	The person performing this task must be able to set up testing environments in accordance with testing environment requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application testing environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Install a server-side operating system; 2. Configure network parameters of the operating system; 3. Configure service permissions of the operating system; 4. Install scripting tools; 5. Install automation tools; 6. Install the project's terminal products; 7. Install integration testing tools;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Configure the network environment and service environment of an operating system; 1.2 Install and configure project products; 1.3 Install and configure project testing tools. 2.0 Principles The person performing this task must be able to	

8. Install performance testing tools; 9. Observe health, occupational and environmental safety rules and regulations.	explain the following principles: 2.1 Server operation principles; 2.2 Operating system configuration principles; 2.3 Project testing specifications. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Methods to configure operating system services; 3.2 Methods to configure operating system networks; 3.3 Android OS and iOS configuration theories; 3.4 Methods to install and operate mobile terminal products. 4.0 Essential Skills 4.1 Communication skills; 4.2 Computer application skills; 4.3 Report writing skills; 4.4 Teamwork skills; 4.5 Time management skills. 5.0 Math Skills 5.1 Calculation skills; 5.2 Statistical skills; 5.3 Mathematical analysis; 5.4 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Testing environments are designed and schemes are configured in accordance with testing environment requirements and service specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety;

	4. Definition of the scope of liability.
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OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	TEST PROJECT SYSTEM	DUTY NO.	704
TASK TITLE	WRITE DOCUMENT FOR PROJECT SYSTEM TESTING	TASK NO.	7042
PERFORMANCE CRITERIA	The person performing this task must be able to develop a project system testing document in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Testing document editor software; 5. Spreadsheet; 6. Diagramming software; 7. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Write project testing requirement plans;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to:	

2. Write project testing plans; 3. Write project testing use case documents; 4. Write project testing reports; 5. Formulate project testing procedures; 6. Write test execution reports; 7. Write test exception reports; 8. Review testing documents; 9. Observe health, occupational and environmental safety rules and regulations.	1.1 Determine project testing flows; 1.2 Formulate design specifications for testing documents; 1.3 Write project testing plans; 1.4 Summarize and analyse test results. 2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Software lifecycle principles; 2.2 Software engineering principles; 2.3 Project testing specifications. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Project testing methods; 3.2 Integration testing method; 3.3 Performance test method; 3.4 Automation testing method; 3.5 White-box testing method; 3.6 Black-box testing method. 4.0 Essential Skills 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills; 4.5 Time management skills. 5.0 Math Skills 5.1 Calculation skills;
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	5.2 Statistical skills; 5.3 Mathematical analysis; 5.4 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	A project system testing document is developed in accordance with technical requirements and service specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	TEST PROJECT SYSTEM	DUTY NO.	704
TASK TITLE	TEST SYSTEM INTEGRATION	TASK NO.	7043
PERFORMANCE CRITERIA	The person performing this task must be able to carry out system integration testing in accordance with testing requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Testing document editor software; 5. Spreadsheet; 6. Diagramming software; 7. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Design front- and back-end data interaction; 2. Carry out front- and back-end interface joint debugging; 3. Write module self-check codes, and design module function indicator		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Carry out black-box testing; 1.2 Write scripts to complete white-box testing; 1.3 Use tools to complete automation testing; 1.4 Carry out the test walkthrough.	

and parameter requirements; 4. Analyse and locate the problems found during integration testing; 5. Test module coupling; 6. Test system compatibility; 7. Carry out the test walkthrough to check the compliance rate of functional project requirements; 8. Carry out the test walkthrough to check the implementation of system architecture design; 9. Carry out the test walkthrough to check the implementation of system requirements 10. Observe health, occupational and environmental safety rules and regulations.	2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Software engineering principles; 2.2 Project testing specifications. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Integration testing method; 3.2 Automation testing method; 3.3 White-box testing method; 3.4 Black-box testing method. 4.0 Essential Skills 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills; 4.5 Time management skills. 5.0 Math Skills 5.1 Calculation skills; 5.2 Statistical skills; 5.3 Mathematical analysis; 5.4 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	System integration testing is carried out in accordance with testing requirements and service specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety;

	4. Definition of the scope of liability.
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OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	TEST PROJECT SYSTEM	DUTY NO.	704
TASK TITLE	TEST SYSTEM PERFORMANCE	TASK NO.	7044
PERFORMANCE CRITERIA	The person performing this task must be able to carry out system performance testing in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application development environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Testing document editor software; 5. Spreadsheet; 6. Diagramming software; 7. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE		
The person performing this task must be able to do the following: 1. Break down module performance indicators;	Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to:		

2. Carry out special performance testing; 3. Analyse and locate the problems found during performance testing; 4. Test project boundaries; 5. Test project boundary interfaces; 6. Test project accuracy; 7. Test project intensity; 8. Test system response speed; 9. Test the ultimate stress tolerance of system; 10. Test system accuracy; 11. Test project security and confidentiality; 12. Carry out the test walkthrough to check the compliance rate of project performance indicators; 13. Observe health, occupational and environmental safety rules and regulations.	1.1. Complete black-box testing based on test cases; 1.2. Write scripts to complete white-box testing; 1.3. Use tools to complete automation testing; 1.4. Carry out the test walkthrough. 2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Software engineering principles; 2.2 Project testing specifications. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Performance test method; 3.2 Automation testing method; 3.3 White-box testing method; 3.4 Black-box testing method. 4.0 Essential Skills 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills; 4.5 Time management skills. 5.0 Math Skills 5.1 Calculation skills; 5.2 Statistical skills; 5.3 Mathematical analysis.

DESCRIPTION OF THE END PRODUCT / SERVICE	System performance testing is carried out in accordance with technical requirements and service specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety; 4. Definition of the scope of liability.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATIO N CODE	
DUTY TITLE	IMPLEMENT AND MAINTAIN PROJECT	DUTY NO.	705
TASK TITLE	SET UP AND DEPLOY PROJECT IMPLEMENTATION ENVIRONMENT	TASK NO.	7051
PERFORMANCE CRITERIA	The person performing this task must be able to set up and deploy project implementation environments in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application O&M environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Document editor software; 5. Spreadsheet; 6. Diagramming software; 7. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Install visual O&M tools for operating systems; 2. Configure visual O&M tools for operating systems; 3. Assign project user permissions;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Install product development tools; 1.2 Configure application servers and log servers; 1.3 Distribute applications based on operating system	

4. Set project document permissions; 5. Install terminal products; 6. Configure terminal product parameters; 7. Write project implementation reports; 8. Observe health, occupational and environmental safety rules and regulations.	types. 2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Data interface transmission protocols; 2.2 Network communication protocol. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Operating procedures of server document configuration; 3.2 Procedures of project deployment; 3.3 Server permission management methods; 3.4 Document management methods. 4.0 Essential Skills 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills. 5.0 Math Skills 5.1 Calculation skills; 5.2 Statistical skills; 5.3 Mathematical analysis; 5.4 Data analysis skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Project implementation environments are set up and deployed in accordance with technical requirements

	and service specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT ENGINEER	OCCUPATION CODE	
DUTY TITLE	IMPLEMENT AND MAINTAIN PROJECT	DUTY NO.	705
TASK TITLE	IMPLEMENT PROJECT MAINTENANCE AND TECHNICAL SUPPORT	TASK NO.	7052
PERFORMANCE CRITERIA	The person performing this task must be able to implement project maintenance and technical support in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the experimental computer room or place with the mobile application O&M environment under the supervision of mobile application development engineers. The tools and equipment to be used include: 1. Commonly-used operating systems, such as Windows, Mac and Linux; 2. Mobile terminals supporting Android or iOS; 3. Software development tools, such as Android Studio, VS code and XCode; 4. Testing document editor software; 5. Spreadsheet; 6. Diagramming software; 7. Safety gear.		
EVIDENCE REQUIREMENT			
PRACTICAL PERFORMANCE		UNDERPINNING KNOWLEDGE	
The person performing this task must be able to do the following: 1. Clean up APP usage fragments; 2. Take preventive measures for product key point boundaries;		Detailed knowledge about: 1.0 Methods The person performing this task must be able to explain how to: 1.1 Formulate product maintenance plans;	

3. Take product function improvement measures; 4. Take system adaptation measures; 5. Take corrective measures for exceptional parameters of products; 6. Back up and migrate user data; 7. Collect product operating indicators; 8. Record product operating indicators; 9. Analyse product operating logs; 10. Formulate product feature upgrading plans; 11. Observe health, occupational and environmental safety rules and regulations.	1.2 Develop corrective measures for key points; 1.3 Submit records of exceptional operation of products; 1.4 Formulate data backup plans; 1.5 Formulate database backup plans; 1.6 Use product operating indicator analysis tools; 1.7 Draft new feature releases. 2.0 Principles The person performing this task must be able to explain the following principles: 2.1 Network communication protocol; 2.2 Data interface transmission protocols. 3.0 Theories The person performing this task must be able to explain the following: 3.1 Concept of the data migration; 3.2 Methods to monitor key points; 3.3 Methods to optimize mobile application products; 3.4 Methods to maintain runtime environments; 3.5 Methods to maintain service statuses; 3.6 New methods to upgrade features. 4.0 Essential Skills 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Report writing skills;
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	4.4 Teamwork skills; 4.5 Network operation skills. 5.0 Math Skills 5.1 Calculation skills; 5.2 Statistical skills; 5.3 Mathematical analysis.
DESCRIPTION OF THE END PRODUCT / SERVICE	Project maintenance and technical support are implemented in accordance with technical requirements and service specifications.
CIRCUMSTANTIAL KNOWLEDGE	Detailed knowledge about: 1. Information security; 2. Secure operations of software; 3. Foundations of occupational health and safety.

APPENDIX: DACUM CHARTS FOR MOBILE APPLICATION DEVELOPMENT

ENGINEER - NTA LEVEL 7

DUTIES	TASKS	ENABLERS
1.0 Plan project requirements	1.1 Survey project requirements.	General skills and knowledge • Planning and organization of requirement surveys • Analysis and statistics of survey data • Key points and skills of requirement survey report writing • Normative writing of requirement survey reports • Key points of project requirement analysis • Commonly-used graphic drawing software • Key points and precautions for use case diagram drawing • Key points and precautions for service flow diagram drawing • Key points and precautions for data flow diagram drawing • User use case diagram drawing • System service flow diagram drawing • Data flow diagram drawing • Data dictionary creation • Project requirement statement writing specifications Tools and equipment • Text editor software
	1.2 Analyse project requirements.	
	1.3 Write project requirements statement.	

		• Computers • Commonly-used operating systems such as Windows, Mac and Linux Requirements for employees • Teamwork spirit • Spirits of honesty and trustworthiness • Quality of time management • Quality of emphasis on commitment
2.0 Design system	2.1 Design system structure.	General skills and knowledge • Use of design chart drawing tools • System hierarchy division • Use of design document writing tools • Data structure design • Concept of the data structure • Design of data's logical relationship models • Definitions of system data types • Division of system interface functions • Design of system's functional models • Concept of the software engineering • Concept of the object orientation • Operation specifications for data design • Division of system interaction functions • Process of system interaction design Tools and equipment • Computers • Commonly-used operating systems such as Windows, Mac and Linux
	2.2 Design system data structure.	
	2.3 Design system interface.	
	2.4 Design system module.	
	2.5 Design system interaction.	

		• Document processing software • Diagramming software • Interface drawing software • Database design software • Modelling tool software Requirements for employees • Teamwork spirit • Spirits of honesty and trustworthiness • Quality of time management • Quality of emphasis on commitment
3.0 Develop mobile application project	3.1 Develop advanced functions of mobile applications.	General skills and knowledge • Development of multimedia service class functions • Development of network communication class functions • Development of sensor class functions • Development of generic class library functions of mobile application development projects • Use of common project frameworks • Diagnosis and modification of design flaws of mobile application development programs • Use of the native component library and third-party open source libraries • Use of common cross-platform frameworks • Development and maintenance of cross-platform projects
	3.2 Develop Application based on standard and open-source libraries.	
	3.3 Establish generic class of project libraries.	
	3.4 Establish project framework.	
	3.5 Develop cross-platform mobile application project.	
	3.6 Develop server-side project.	

		• Analysis and diagnosis of database faults • Use of enterprise-level application development frameworks • Configuration and application of common servers Tools and equipment • Commonly-used operating systems such as Windows, Mac and Linux • Mobile phones, Pads and other mobile terminals supporting Android OS and iOS • Android Studio, VS code, XCode, MySQL and other software development tools Requirements for employees • Teamwork spirit • Integrity • Time management • Intensive study and emphasis on commitment
4.0 Test project system	4.1 Set up testing environment.	General skills and knowledge • Solving of thorny problems encountered during the testing environment setup • Configuration and debugging of services and networks • Maintenance of testing devices and tools • Analyses of project integration interfaces, project criticality, hazards and risks
	4.2 Write document for project system testing .	
	4.3 Test system integration.	
	4.4 Test system performance.	

		• Formulation and writing of test plans, test design, test cases, exception reports, execution reports and other documents • Design of front- and back-end data interaction, and leading of front- and back-end interface joint debugging • Testing of system, hardware and software compatibility • Testing of integration coupling • Performance testing, such as data boundary testing, interface boundary testing, as well as intensity, stress and bottleneck testing • Analysis and location of the problems found during testing • Testing and walkthrough of testing documents Tools and equipment • Computers • Mobile phones, Pads and other mobile terminals supporting Android OS and iOS • JMeter, Selenium, LoadRunner and other testing software Requirements for employees • Teamwork spirit • Spirit of honesty • Spirit of time management
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		• Spirits of intensive study and emphasis on commitment
5.0 Implement and maintain project	5.1 Set up and deploy project implementation environment.	General skills and knowledge • System setup and deployment • Use of debugging tools for implementation environments • Product problem analysis • Server-side configuration • Network configuration and debugging • Mobile platform distribution • Related document writing at this stage • Problem analysis and location Tools and equipment • Commonly-used operating systems such as Windows, Mac and Linux • Computers with Intel I5 or higher-level processors, 8GB or more RAM, and 500GB or more hard-disk memory • Mobile phones, Pads and other mobile terminals supporting Android OS and iOS • Virtual machine environment • Word processing software, project management software, spreadsheet, diagramming software, analysis and design software Requirements for employees • Teamwork spirit • Integrity
	5.2 Implement project maintenance and technical support.	

		• Time management • Intensive study and emphasis on commitment
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