CURRICULUM

Internet of Things Software Development
GRADE X
2021

GOVERNMENT OF PAKISTAN

Ministry Of Federal Education and Professional Training

ISLAMABAD

Contents

Introduction

The Internet of Things (IoT) is a network of resource constrained nodes being capable of automating an existing manual procedure. This IoT network is also connected to the internet to enable ease of access and user friendly configuration and monitoring. An IoT developer is an expert who completely understands the IoT network, its different components and their working. IoT developer is capable of programming sensor and hardware devices. IoT developer is capable of developing a hardware and software for IoT edge devices. He is also trained of sending the data to the cloud server. IoT developer is a specialist in utilizing resource constrained devices. IoT cloud developer is an expert who can install and configure Virtual machines on the cloud. While IoT Data scientist is the one who utilizes the data received on the cloud and saves it efficiently in the databases to train Machine Learning algorithms. IoT security is one of the hot research topic nowadays which will create many skill based jobs in the near future. An IoT developer is incomplete without the understanding and hands on experience of security protocols. In a nutshell, IoT is the start of art technology to automate the industrial, commercial and domestic procedures and there is a need to develop the resources with the required IoT skills which will not only benefit the industry but also create job opportunities for the individuals.

IoT is an ever changing field. The number of IoT nodes are increasing each day and hence their monitoring, upgrading and security needs. Therefore, industry requirement for skilled workforce is increasing which can only be managed through setting relevant competency standards in collaboration with the leading industries.

Rationale

In a world dominated by digital technology, IoT has become the most important development of 21st century. IoT has come to play a prominent role in our lives by linking several systems to give smart performances in every task. It has created evolution of devices and applications impeccably integrated human communication in ways we never expected before. IoT as an emerging paradigm, will continue to pick up steam as more businesses realize the potential of connected devices to keep them competitive. IoT has been acknowledged as one of the foundation stones of Industry due to its potential to change the existing industrial and business processes. With the advent and growth of the IoT, physical environments are becoming smarter and more interconnected than ever before. This has changed the way we live by improving sustainability, efficiency, accuracy, and economy in almost every aspect of our lives. IoT has been leveraged in many industries such as healthcare systems, traffic management, energy management, education, environment monitoring, smart homes, and smart cities.

The Trade of Internet of Things is a profession that is increasingly getting attention in Pakistan because of the population growth and the resultant immense opportunities in this technology trade not only among the youth seeking to enter the industry but also among adults who wish to polish their skills to develop a career out of it.

This course aims to enable students to acquire a set of knowledge and concepts, and develop a range of technical, personal, interpersonal, organizational, and generic skills, that can be applied in various contexts, both within and related to trade of IoT domain. Furthermore, this course will stimulate the learners towards entrepreneurship in the industry.

Within this qualification relating to IoT interventions in schools, there are important interventions integrated within school settings. The purpose of this qualification is to strengthen connections between schools and trade and drawing on the concept of the socio technical network, theories the interactions between the relevant market and school contexts.

Internet of Things, Matric Tech (9^{th}&10^{th})

Aims and Objectives

The specific aims of developing IoT qualification are:

- To Promote skills of the youth to maximize employment opportunities at national and international level.

- To provide skillful manpower for IoT based near future life.
- To mold students to develop skills about the use of IoT in daily life devices and make some new innovative devices.
- To recognize the factors contributing to the emergence and future trends of IoT within broader ICT industry.
- To examine the potential business opportunities that IoT can uncover.
- To capture and generate value from the application and use of IoT technologies.
- To provide students with a smooth transition to work.
- To enable students to construct a personal roadmap to gain strategic advantage from IoT.

Objectives

After completing this, the students will be able to:

- Explain Internet of Things in different contexts.
- Take account of the key components that make up an IoT system.
- Learn the concept and capabilities of smart thing and physical principles of sensing.
- Explore IoT enabling technologies, architectures, and standards.
- Acquire the basic competence of IoT Hardware and Software development
- Identify infrastructure for IoT developments.
- Apply IoT knowledge to implement small-scale IoT Project.
- Design, build and integrate IoT platforms, incorporating different types of sensors and actuators, micro-controllers, and devices.
- Understand IoT protocol stack and fundamentals of Social IoTs.

Grade-X–Internet of Things Software Development

Learning Themes and Students' Learning Outcomes Knowledge, Skills and Attitudes					
Chapter 01(Scripting Python)					
T = 16, P = 22, Total = 38					
Content	**Students' Learning Outcome**	**Activities/Practical**	**Duration**	**Tools**	**Workplace**

Introduction	**The students will be able to:**
	• describe Python
	• describe structure of Python program
	• know life cycle of Python program
	  ○ coding
	  ○ interpreting / compiling
	  ○ execution
	  ○ debugging
	• difference between script and a program
		• Discussion on structure and life cycle of Python
		• Presentation on difference between script and program
			1 Periods (T)
			2 Periods(P)
				• White board
				• Multimedia
				• Internet
				• Computer system
					Classroom and Lab

Programming Environment setup	**The students will be able to:** • install Python interpreter • describe coding conventions of Python • use Python's interactive prompt • write and execute stored program in Python	• Write instruction to print 'hello world' in Python interactive prompt • Write and execute a program that prints "hello world" in Python	1 Periods (T) 2 Periods(P)	• White board • Multimedia • Internet • Computer system • IDE for Python language	Classroom and Lab
Input output statements	**The students will be able to:** • use print statement • use input statement	• Take integer input from a user and print it • Write a program that asks user for his/her Name and then greets the user with the provided Name	1 Periods (T) 2 Periods(P)	• White board • Multimedia • Internet • Computer system • IDE for Python language	Classroom and Lab

Arithmetic statements	**The students will be able to:**
	• understand data types and variable
	• understand mathematical operators available in Python
	  ○ unary operators
	  ○ binary operators
	• understand precedence of operators
	• implementarithmetic expression in Python.
		• Implement a program to add and multiply two numbers taken from user and display result
		• Implement a program to convert temperature from Centigrade to Fahrenheit
			2 Periods (T)
			2 Periods(P)
				• White board
				• Multimedia
				• Internet
				• Computer system
				• IDE for Python language
					Classroom and Lab

Decision control	**The students will be able to:** • describe conditional statements and its types	• Write a program to calculate the grade of a student based on entered marks	3 Periods (T) 3 Periods(P)	• White board • Multimedia	Classroom and Lab

	○ if statement ○ if else statement ○ switch statement • understand nested decision statements. • implement decision controls in Python program	• Write a program using switch statement that asks the user for two numbers and the arithmetic operation (+,-,/,*) to perform on them and display result accordingly • Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd.		• Internet • Computer system • IDE for Python language	
Loop	**The students will be able to:** • define concept of loop • describe FOR Loop in Python • describe WHILE Loop in Python • understand handling control variables for a loop • understand breaking a loop • implement loop in a Pythonprogram • understandnested loop	• Write a program to generate first 10 multiples of any given number • Write a program to draw write angle triangle using asterisk (*) • Write a program to implement an arithmetic calculator using loop	3 Periods (T) 3 Periods(P)	• White board • Multimedia • Internet • Computer system • IDE for Python language	Classroom and Lab
Arrays and lists	**The students will be able to:** • describe concepts of array • explain indexing and access of array • describe concepts of list • explain indexing and access of array • implementing arrays and lists in Python program	• Write a program to store ten values from user in an array • Write a program to find a given integer value in an array already filled with integers • Write a program that takes name of the user and its marks for all Matric subjects and store it in a list and calculate their average	3 Periods (T) 4 Periods(P)	• White board • Multimedia • Internet • Computer system • IDE for Python language	Classroom and Lab
Built-in functions	**The students will be able to:** • describe built-in functions and its types • understand return types • understand parameters • usage of built-in function	• Develop a program to solve quadratic equation based on input • Develop a program to calculate trigonometric identities for any given angle • Develop a program that finds the minimum and maximum value from a list using built-in-function	2 Periods (T) 4 Periods(P)	• White board • Multimedia • Internet • Computer system • IDE for Python language	Classroom and Lab
Chapter 02 (Operating system for IoT)					
T = 7, P = 6, Total = 11					
Content	**Students' Learning Outcome**	**Activities/Practical**	**Duration**	**Tools**	**Workplace**
Introduction to IoT OSs	**The students will be able to:** • describe IoT OS and its names	• Presentation on characteristics of IoT OS	3 Periods (T) 2 Periods(P)	• White board • Multimedia	Classroom and Lab

	• characteristics of IoT OS • differentiate between conventional OS and IoT OS	• Group discussion on various IoT OS and their pros and cons for specific IoT applications		• Internet • Computer system	
Open system interconnection model (OSI) layered architecture	**The students will be able to:** • define OSI architecture • describe IoT application layer protocols (MQTT, CoAP) • describe IoT transport layer protocols(DTLS) • describe IoT network layer protocols (IPv6) • describe IoT physical layer protocols (Wfi, Bluetooth, Zigbee)using MQTT broker and clients	• Discussion on differentiate between conventional protocol and IoT protocol • Use open source MQTT client android app to send data to MQTT broker	4 Periods (T) 4 Periods (P)	• White board • Multimedia • Internet • Computer system • Android mobile	Classroom and Lab

Chapter 03 (Introduction to Database)

T = 10, P = 13,Total = 23

Content	Students' Learning Outcome	Activities/Practical	Duration	Tools	Workplace
Introduction	**The students will be able to:** • describe the concept of data as info • describe database • importance of a database • explain applications of database • describe some known database systems	• Presentation on application of data base in real life	2 Periods (T) 2 Periods(P)	• White board • Multimedia • Internet • Computer system	Classroom and Lab

Relational Database Management System (RDBMS)	**The students will be able to:**
	• define RDBMS
	• understand concept of table, rows and columns
	• understand concept of entity and attributes.
	• understand concept of relations and record.
	• useentity relationship (ER) modeling to describe data
	• describe schema
	• understand concept of constraints
	  ○ primary key
	  ○ foriegn key
	• create schema
		• Create a schema for a given problem containing minimum 4 entities using MS Office.	4 Periods (T)
			3 Periods(P)
				• White board
				• Multimedia
				• Internet
				• Computer system
				• MS office
					Classroom and Lab

Database (DB) installation	**The Students will be able to:** • know the installation process of MySQL database • Explain the usage of visual browser for MySQL	• Create a physical schema for a browser using visual browser	2 Periods (T) 3 Periods(P)	• White board • Multimedia • Internet • Computer system	Classroom and Lab

	• understand the installation process of visual browser for MySQL • create a physical schema using visual browser • export/ Import schema using visual browser			• MySQL workbench, MySQL query browser • MySQL database	

Interaction with DB	**The students will be able to:**
	• define query
	• use Basic SQL queries in a database to:
	  ○ CREATE
	  ○ READ
	  ○ UPDATE
		• Create a database for a small problem using SQL commands
		• Insert few records to the database using SQL command
		• Select and delete few records from the database using SQL command
			2 Periods (T)
			5 Periods(P)
				• White board
				• Multimedia
				• Internet
				• Computer system
				• MySQL database
				• MySQL workbench, MySQL query browser
					Classroom and Lab

Chapter 04 (IoT Cloud Deployment)					
T = 8, P = 14,Total = 19					
Content	**Students' Learning Outcome**	**Activities/Practical**	**Duration**	**Tools**	**Workplace**
Introduction to Cloud	**The students will be able to:** • define cloud • explain different types of cloud • understand characteristics of cloud • describe advantages and disadvantages of cloud	• Individual presentation on cloud services.	2 Periods (T) 3 Periods(P)	• Multi-media projectors • Internet & web browser • Computer-systems • Cloud Provider	Classroom & Lab
Cloud service providers	**The students will be able to:** • define cloud service providers • explain different types of cloud models • describe usage of cloud service providers in cloud	• Group presentation on cloud service providers. • Identify each application of the cloud in daily use.	2 Periods (T) 3 Periods(P)	• Multi-media projectors • Internet & web browser • Computer-systems • Cloud Provider	Classroom & Lab
Set up cloud server	**The students will be able to:** • define cloud server • understand the process to create an account and login on a cloud server provider's dashboard. • know of virtualization and virtual machines. • create a virtual machine.	• Create an account on online cloud service provider. • Create a virtual machine and configure inbound and outbound rules. • Install MQTT broker on the cloud and connect your local MQTT client with this broker	4 Periods (T) 8Periods(P)	• Multi-media projectors • Internet & web browser • Computer-systems • Cloud Provider	Classroom & Lab

	• understand of different configurations available on the dashboard • install an OS on virtual machine. • define inbound and outbound rules to open ports for SSH and FTP.				
Chapter 05 (Basics of Data Science)					
T = 12, P = 19,Total = 31					
Content	**Students' Learning Outcome**	**Activities/Practical**	**Duration**	**Tools**	**Workplace**

Introduction to Data Science	**The students will be able to:**
	• define data science
	• understand the basic concepts, attributes, & features of data
	• explain relationship between data science & IoT
	• data preprocessing
	• concept of:
	  ○ mean
	  ○ median
	  ○ mode
	  ○ standard deviation/variance
		• Presentation on application of Data Sciences.
		• Calculate Mean, Median, & Mode in MS Excel using iris or any other data set
			3 Periods (T)
			5 Periods(P)
				• Multi-media projectors
				• Internet & web browser
				• Computer-systems
				• MS Excel
					Classroom & Lab

Data Visualization	**The students will be able to:** • define data visualization • explain components of data visualization. • understandof graphs and its types • describe heat map • identify trends in data • know about tools available in Python to visualize different type of data • process the import of CSV file in Python • calculate mean, median, mode, standard deviation, variance	• Apply different data visualization techniques on iris or any other data set. • Calculate mean, median, mode, standard deviation, & variance in Python	3 Periods (T) 5 Periods(P)	• Multi-media projectors • Internet & web browser • Computer-systems	Classroom & Lab
Introduction of Machine Learning	**The students will be able to:** • define machine learning • define association rule and reinforcement learning • explain types of regression & classification. • define supervised and unsupervised learning • understand training and testing of machine learning algorithm on a	• Identify the regression and classification problem for a given use case • Identify supervised and unsupervised problem for a given use space • Apply KNN on a given data set in Python	6 Periods (T) 9 Periods(P)	• Multi-media projectors • Internet & web browser • Computer-systems	Classroom & Lab

	data set • understand and apply K nearest neighbor (KNN) on a data set				
Chapter 06(IoT Security)					
T = 11, P = 17,Total = 28					
Content	**Students' Learning Outcome**	**Activities/Practical**	**Duration**	**Tools**	**Workplace**
IoT gateway protection	**The students will be able to:** • define IoT Security • describe threats to IoT • describe security attacks on IoT, • elaborate Wi-Fi attack. • understand Wifi encryption. • understandthe concept of ACL/MAC filtering in Wi-Fi router. • apply AES/TKIP on IoT gateway • apply MAC address filtering	• Apply MAC filtering on Wi-Fi Router • Apply AES on Wi-Fi Router/IoT gateway.	4 Periods (T) 6 Periods(P)	• Computer system • Multimedia projector • Wi-Fi router • IoT netwok	Class room and Lab
Device to device / end to end communication security	**The students will be able to:** • know end to end communication. • describe micro services. • knowand understand devices: o users account, o privileges setting, o update firmware, • describe isolation and its importance. • understand ssl • install ssl certificate on client • understand physical security and techniques (deterrence, delay and detect) • understand hashing and encryption. • know about installing and using crypto module library. • knowabout hashing function used in securing MQTT • enlist security ambiguities in MQTT protocol • enlist attacks and threat to MQTT protocol • secure MQTT with encryption	• Create and delete a user account in any end devices. • Update any end device firmware • Isolate a IoT device from public network. • Install a SSL certificate on client • Implement physical security on nodes. • Use MQTT on application layer • Apply encryption on MQTT	7 Periods (T) 11 Periods(P)	• Computer system • Multimedia projector • Wi-Fi router • IoT netwok	Class room and Lab
Chapter 07 (Soft Skills)					
T = 9, P = 16, Total = 25					

Content	Students' Learning Outcome	Activities/Practical	Duration	Tools	Workplace
Introduction to soft skills	**The students will be able to:** • know the basic soft skills • understand the importance of soft skills in daily life • apply soft skills for academic and professional success	• Group discussion and model presentation on soft skills	02 Periods (T) 04 Periods (P)	• Multimedia, projector or LED TV with good sound system	Classroom
Communication Skills	**The students will be able to:** • know model of communication. • know importance of active listening and responding. • understand effective communication. • identify obstacles in communication.	• Perform role play and group exercises through listening audio or video documentaries. • Carry out practice amongst students to reflect verbal and non-verbal communication.	02 Periods (T) 03 Period (P)	• Multimedia, projector or LED TV with good sound system	Classroom
Leadership and teamwork	**The students will be able to:** • know the importance of teamwork in a professional environment. • understand the concept of teamwork and leadership.	• Give students some task to observe teamwork and leadership properties among them	02 Periods (T) 03 Period (p)	• Multimedia, projector or LED TV with good sound system	Classroom
Time Management	**The students will be able to:** • know the concept of better time management. • observe time management in daily life • understand professional and personal time management.	• Arrange a small competition task following time management and make a schedule the tasks.	01 Periods (T) 03 Period (p)	• Multimedia, projector or LED TV with good sound system	Classroom/ Lab
Attitude, behavior, and customer care	**The students will be able to:** • know the concepts of attitude and behavior • understand the impact of positive and negative attitude in professional life	• Through different scenarios practically apply the principles of customer care and positive attitude. • Exercise and deal with problematic and angry persons by conducting role plays	02 Periods (T) 03 Periods (P)	• Multimedia, projector, or LED TV with good sound system	Classroom/ Lab

Assessment and Evaluation

Assessment is the practice of collecting evidence of student learning. It aims at improving learning and teaching as well as recognizing the achievement of students. It determines students 'progression through their learning experiences and enables them to demonstrate that they have achieved the intended learning outcomes. The assessment is aligned with curriculum aims, design and learning processes.

Evaluation is an integral part of teaching-learning process. It involves gathering information through various assessment techniques, making valuable judgment and sound decisions. Assessment provides information and teaching about students' achievement in relation to learning objectives. With this information, the teacher makes informed decisions about what should be done to enhance the learning of students or to improve teaching methods. Assessment must be:

- Mainly open-ended, allowing for discussion and revision of new understanding.
- Tolerant of divergent thinking of students and promote the notion of no ''one right answer''.
- Presented in alternative mode, not just paper-and-pencil responses to limiting questions.
- Designed to foster analysis, comparison, generalization, prediction, and modification according to the grade and development level.
- Capable of promoting collaboration and team effort in demonstration of competence.
- Ongoing and cumulative, showing growth over time.

Formative (Internal) Assessment

Internal assessment refers to the assessment practices employed as part of the learning and teaching process. It is an ongoing process throughout the session and uses Test — Feedback — Adjust cycle repeatedly to improve students' performance and efficiency in learning and teaching. In designing internal assessment for the subject, teachers should maintain a proper balance between the formative and summative functions of assessment. It should be comprehensive to cover all the objectives as per curriculum. A diversity of assessment modes should be adopted so that students are given opportunities to develop and demonstrate the full range of learning outcomes of the curriculum, including those of knowledge, skills and values and attitudes.

Methods for Internal/Formative Assessment

Following tasks can help in formative assessment;

- Demonstration
- Practical exercises
- Group discussion
- Role play
- Oral/Multimedia presentation
- Test
- Assignment

- Quiz

Feedback on students work in all of the above tasks must be prompt, effective, and efficient. Assessment should have questions setting that specifically help in finding out knowledge, understanding and skills that can evaluate the competency of trainee.

Summative /External Assessment

Summative assessment will be managed by concerned Board of Intermediate and Secondary Education. It will be composed of two parts;

1) Theory Assessment /Written examination: The theory examination is suggested to consist of a wide variety of questions. Its overall weight age should be 40 %. It should be based on the curriculum rather than textbook. The assessment should be designed to examine the candidate's understanding of the whole syllabus and should test the range of abilities according to Bloom Taxonomy.

2) Practical Assessment/Practical examination: This is designed to test practical skills of students. Its overall weight age should be 60%. It will comprise of written exam (10%), practical (70 %) and viva/oral exam (20%).

A standards-referenced approach will be adopted for grading and reporting student performance. The purpose of this approach is to recognize what each student can do the in the subject at the end of the 2-year secondary school level education. The performance of each student will be matched against a set of performance standards, rather than comparing to the performance of other students. It makes the implicit standards explicit by providing specific indication of individual student performance. Descriptions will be provided for the set of standards.

Guidelines for Writing a Textbook

A textbook is an important teaching and learning resource and one of the most extensively used resources in classrooms. To reflect national needs and aspirations the needs and aspirations, the textbooks should be written in accordance with this curriculum. This curriculum meets not only the general aims and objectives but also fulfills the specific requirements of the individual subject. As the textbook serves as a framework for teaching, the author/authors should consider the following features:

- A textbook must include an introduction to the textbook, explaining how to use the textbook
- The textbook must be in line with the national curriculum, covering all SLOs of each content.
- Content and illustrations must be culturally, contextually and age appropriate.
- All text and material must be accurate, up-to-date and error-free.
- The continuity of the concepts, their integration and logical development should be ensured.
- Horizontal and vertical overlapping of the concepts should be avoided.
- The textbook should be informative and interactive with questions to be put at suitable intervals to provoke the students to think.
- The language used should be simple, clear, straight forward, unambiguous and easily comprehensible by the students of the particular level.

- Simple questions may be asked within the chapter, which requires students to recall, think, and apply what they have just learnt as well as to reinforce the learning of the concepts and principle.
- The examples and applications should be from everyday life and be supportive of our cultural values.
- Photographs and illustrations should be clear, labeled and supportive of the text. Tables, flow charts and graph may be given wherever needed.
- Key points at the end of each chapter should provide a summary of the important concepts and principles discussed in the chapter.
- End-of-the-chapter exercises must include a variety of assessment styles based on levels of Bloom's Taxonomy. These should encourage students to think, develop skills, and use information for a variety of purposes.
- Textbooks should be free from all kinds of biases including, gender, religion, occupation, social background etc.
- To make the students self-learner use of IT based resources may be encouraged. Relevant internet links and other online resources may be included.
- Glossary of the new vocabulary must be included.

Guideline for planning and writing a chapter

The textbook author may decide the titles of each chapter and can choose to cover students' learning outcomes (SLOs) from any themes in developing the content of the chapter. The textbook author must also keep in mind that a number of SLOs cannot be addressed in the text (as if this is done it would lead students to simply memorize the text and not serve the realization of the curriculum). These SLOs could be realized through questions and practical activities within and at the end of the chapter exercises.

- Learning outcomes must be given at beginning of each chapter.
- Decide on key ideas, facts, concepts, skills and values that can be developed.
- Illustrations must clearly convey the desired concept.
- Activities must demand from students to do inquiry and problem solving according to grade level.
- Ensure that the content is up to date, accurate and developmentally appropriate.
- Contents must be in line with chapter outcomes.
- Language must be consistent, culturally appropriate and grammatically correct (as if talking to a group).
- Language must engage and hold reader's attention.
- Recall previous learning, where possible.
- Structure the writing so that the sentence is simple, paragraphs deal with single ideas etc.
- Interesting information in the form of tidbits, fact file, point to ponder etc. must be given.
- Write a summary/concept map at end of each chapter, reviewing key knowledge and skills.
- End-of-chapter exercises
- Recall and integrate previous learning
- Engage students and develop their creativity
- Move from lower to higher order thinking
- Focus on multiple intelligences
- Keep the text contextually relevant in line with local teaching and learning.

- Provide website links for further research

Guidelines for Writing Learner Workbook

Workbooks are books that contain writing activities and exercises that build upon each chapter in the textbook. Workbook exercises help students to develop conceptual understanding of the concepts dealt with in the text, to develop skills and to apply knowledge to new situations. Basic features of a workbook A workbook should have:

- Various exercises and activities for each chapter, topic, subtopic.
- Exercises and activities that will enable student to develop and practice the content knowledge, skills and higher order thinking.
- Accurate and variety of exercises.
- Clear illustrations/ examples/ explanations to show what students are supposed to do, and/or what product looks like.
- Exercises and activities with a variety of purposeful, stimulating, challenging and innovative items to encourage students to review and practice the knowledge and skills they have learnt.
- Exercises that include both constructed and restricted response items.
- Activities, which requires readily available, acceptable, and affordable materials and resources.

Basic Requirements for Lab (Tools/Equipment)

SR#	**Tools & Equipment**
1	Antivirus
2	Backup software
3	Cable connectors
4	Cable Tester
5	Computer Network
6	Computer system
7	Encryption software
8	Firewall software
9	Internet
11	Multimedia projector
12	Network
13	Network cable CAT5,CAT6

14	Networking Tools
15	Router
16	Switchers
17	Wifi router
18	Wireless router
19	Android mobile
20	Cloud Provider
21	Computer system
23	MS office
24	Multimedia, projector or LED TV with good sound system
25	Window image
26	Linux image
27	MySQL database
28	MySQL workbench, MySQL query browser
29	Python
30	White board
31	IoT network
32	IDE for C language
33	IDE for Python language
34	Cable puncher