

# Learning Objectives for Course CIT501 (Hardware)

## GPOs covered within CIT501

**GPO1:** Apply the fundamentals of IT technical support concepts and practice to securely manage hardware, software, and networking resources to support end users and meet security, ethical and organisational requirements. (5 Credits)

**GPO2:** Apply the fundamentals of information systems concepts and practice, including business concepts, development life cycles, data modelling and administration, to support and enhance organisational processes and systems. (3 Credits)

**GPO5:** Apply professional, legal, and ethical principles and practices in a socially responsible manner as an emerging IT professional. (2 Credits)

**GPO6:** Apply communication, collaboration, teamwork, documentation, and customer service skills to enhance effectiveness in an IT role. (3 Credits)

**GPO7:** Apply critical analysis and decision-making techniques to solve IT problems and provide relevant and timely outcomes. (2 Credits)

## Learning Objectives (LOs) for CIT501

Below is a brief description of each LO and an explanation of the terms used in the LO. At the conclusion you will be expected to know the terms, explain what they cover, and related information. If there are multiple items with a term (e.g. “support practices” in LO1) you will be expected to name various of those terms, describe them, and demonstrate the appropriate use of each of them. Examples always help.

**LO1:** Manage hardware using technical support practices in order to meet organisational requirements. (5 Credits)

**Managing hardware** within an IT environment covers the entire life cycle of hardware for the client. This will include:

- Recommending hardware solutions
- Purchasing and/or supplying hardware on behalf of the client
- Installing and configuring according to the client’s requirements
- Monitoring and maintaining the hardware
- Decommissioning and disposal of the hardware

**Technical support practices** cover a range of ways that IT professionals track, audit, and maintain hardware. There are two main types of tools that IT professionals use to assist in managing hardware. These tools will either keep an inventory of the hardware or monitor hardware.

Dedicated software used to keep the inventory is called IT Asset Management (ITAM) software. This software can be used to discover new hardware within the network or can be updated manually depending on the software used and complexity it has.

The other major set of tools used by IT professionals monitor the state of the hardware (e.g. CPU utilisation, hard disk free space, Memory use) to provide insights into when replacement may be required or indicators of impending hardware failure.

IT professionals will follow the best practices in hardware service and delivery as detailed by the ITIL framework.

The term **organisational requirements** reflect that different organisations have different needs. While all organisations must cover the four (4) key business functions (Human Relations, Finance and Accounting, Sales and Marketing, and Operations) they do it in different ways. Each organisation also has different growth strategies, support needs, and many other requirements that the IT services must be able to meet in a secure and reliable manner.

**LO2: Support and enhance hardware systems using applicable tools, models, and techniques in order to improve performance. (3 Credits)**

**Support and enhance hardware systems** requires analysing the performance of the installed hardware to ensure that it is performing to the best of its ability for the client. If it is not performing optimally, recommending solutions to the client that will enhance the performance.

The tools available to the IT professional will vary according to the device and the software that is installed. Within Microsoft Windows there are a number of built-in tools such as Task Manager, Resource Monitor, and Performance Monitor. Linux has different performance monitoring tools, but one that is widely used is called Top, the equivalent of Task Manager.

There are also dedicated tools such as Windows Performance toolkit. This will analyse utilisation of key parameters.

One widely used tool to improve utilisation of hardware, particularly servers, is virtualisation.

The models cover “the way things work”. This could cover the different configurations of computer components based on the intended use of the device.

The techniques cover “the way things are done”. This could include using specific tools to identify why a computer is not performing adequately and then using the findings to recommend an upgrade that would improve the performance.

There are various techniques that can improve the performance of hardware. CPU performance can be improved by overclocking, done in the UEFI settings, according to the model of Amdahl’s Law for assessing potential speed increase. Memory utilisation can be improved by adjusting memory allocation and the configuration of the page file settings based on Little’s law for optimising throughput in the Windows System advanced configuration page.

Other techniques not only improve performance, but may also be used for increased reliability, and thus better security of data. One of the major techniques for this is RAID configurations of storage drives can

be used to distribute data across multiple disk controllers to not only improve performance but also create redundancy of data in certain configurations. Monitoring disk queue length in tools such as performance and resource monitor will indicate when the disk controller is limiting performance.

The principles can be used to improve performance and reliability of network interfaces. Using a technique called teaming, multiple network interfaces can be combined to behave as if they were one. A technique often used on servers is to team four (4) 1Gbps NICs to make it appear to the OS that there is one 4 Gbps NIC installed on the server.

Another common technique for improving the performance of large networks is using “virtual networks” or “VLANs”. This has a similar effect to virtual machines by increasing the number of network switches and limiting the amount of traffic on each network.

**LO3: Apply professional and ethical practices to hardware maintenance projects in order to enhance awareness of social responsibility as an emerging IT professional. (2 Credits)**

IT professionals operate under a number of different **professional and legal requirements**. The New Zealand Institute of IT Professionals (ITP) provides the professional framework which has both a code of practice and code of conduct. The majority of IT Professionals use the ITIL framework as the guide to best practices on how the work should be done. The legal framework for handling client data is principally covered by the Data Privacy Act of 2020 while other aspects of health and Safety come under the Health and Safety at Work Act of 2015.

The general understanding is that IT is to be used for the betterment of society, and IT professionals have a responsibility to ensure that it is used to improve the welfare of people within the communities (public in general, clients, and IT Professionals).

**LO4: Resolve hardware service-related issue using a collaborative approach in order to enhance communication skills. (3 Credits)**

Support work in IT is often done in collaboration. The helpdesk receives a report of a problem and does some initial data collection and, if it is not a straight forward solution or requires site-specific knowledge, will include the site technician in the process as well as the contact person from the site. While the ticket remains assigned to the helpdesk technician that person is the person responsible for resolving the issue. Communication between the person responsible for the issue being resolved, the one with the technical knowledge of the site or the technical knowledge of the service, and the person acting on behalf of the client is essential for a satisfactory resolution of the problem.

The generally accepted best practice for resolving IT issues is the CompTIA troubleshooting process. This process collects sufficient information to form a theory, which is then tested. Once the cause of the problem has been confirmed a plan for their resolution must be developed and implemented. The client will confirm the resolution of the problem and the ticket is not closed until it has been fully documented.

An important part of enhancing any IT practices involves reflection. Reflection requires noting what went well and why and looking to build so that, as per the ITIL framework each interaction with the client is better than the last and builds value for the client. The IT Professional needs to reflect on the skills required, the knowledge they have, and what is called “soft-skills” which includes communication.

In a team environment it is often the communication that make the difference to the quality of the outcome.

LO5: Apply problem-solving and decision-making techniques to complete a hardware project in order to support an innovative undertaking. (2 Credits)

Problem-solving, in the context of IT, is about resolving an issue a client is having. While it may be about a piece of hardware malfunctioning, it may also be about not having the required hardware to perform a specific task.

The person to whom the ticket has been allocated is the project manager. It is the responsibility of the project manager to make the decisions around the processes required. In hardware this would involve the recommending of hardware, purchasing (if requested by client), arranging delivery, scheduling installation, confirming functionality, and gaining client sign-off.

An innovative undertaking means “non-standard”. Will be able to consider what is available and be able to recommend, install, and configure for the client appropriate hardware that will meet their needs.

## Assessments in CIT501

The above learning objectives will be assessed in one assessment:

**Assessment 1:** Project: (100%). This will assess all five (5) LOs in the course and is worth 15 credits.