Topic 1: Determine the requirements of building the script

THE STUDENTS WILL BE LEARNING THE FOLLOWING THINGS IN THIS TOPIC:

- Understand SDLC (***re: element 1.1***)
- Intellectual property and copyright (***re: element 1.1)***
- Scripting for IT Security (***re: element 1.3)***
- History of Python Scripting
- Why is Python Scripting
- Syntax and concepts of Python
- Python 2.0 and Python 3.0 IDE (Integrated Development Environment)

  (***re: element 1.2***)

System Development Life Cycle (SDLC)

The learner will develop a project at the end of the course, so it important to gain the knowledge about SDLC., which is used to model or provide a framework for any software system or scripting and manage the system development. There are seven Phases in a System Development Life Cycle, they are:

PLANNING OR INITIATION

This is the first step of SDLC, which is to determine solutions for the required system, to find out the scope of the proposed system based on the resources including technical and human resources, budget, time frame.

SYSTEM ANALYSIS & REQUIREMENTS

This stage determines the functionalities of the required system, analysing the needs of the end user or organization to ensure the new system meets their goals.

SYSTEM DESIGN

The system flowchart, Data Dictionary and Scripting Pseudocode are created in this phase. Scripting should be characterised and the protocols of the scripting should be identified.

DEVELOPMENT

This is where the coding starts based on the previous phases. It is important to develop an effective system to meet the user's requirements, so it necessary to ensure that the resources are sufficient to handle the proposed system.

INTEGRATION AND TESTING

Achieving bug free software can be the result of many testing processes. This is an iterative procedure - code must be corrected and then retested.

This process is normally carried out by a testing programmer working with a Quality Assurance professional to determine the system meets the goal of business.

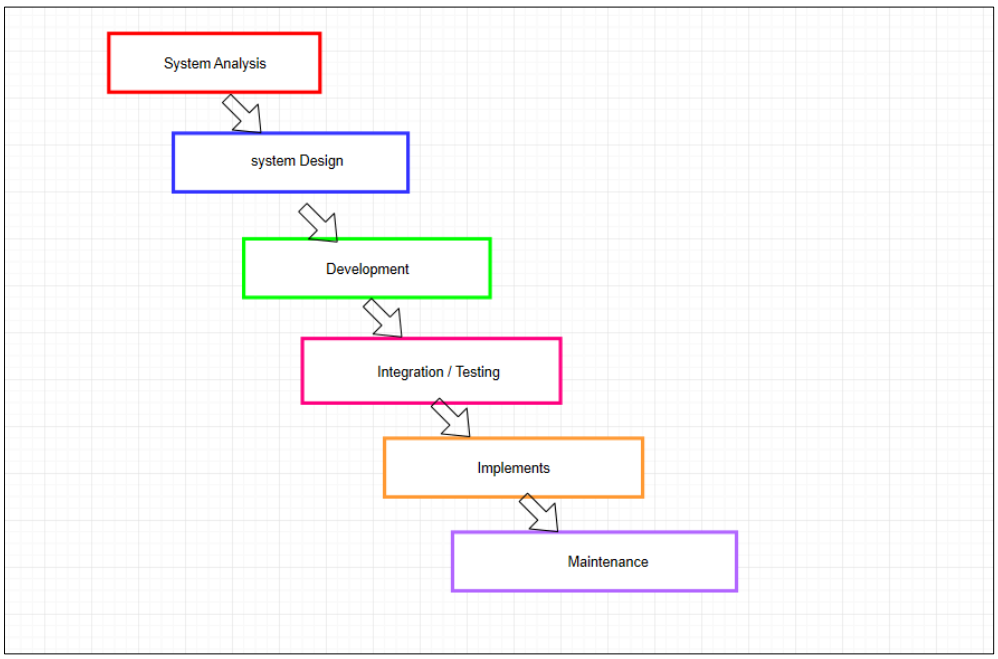
IMPLEMENTATION

This is a process to install a new system, to move the old system out before installing the new one if there is an existing system.

The business also receives documentation to instruct users on how to operate the new system. A short list of troubleshooting items should be provided along with support contact details.

MAINTENANCE AND OPERATION

This is the last phase of SDLC, the organisation starts to operate the system, and also they need to keep the new system maintained.



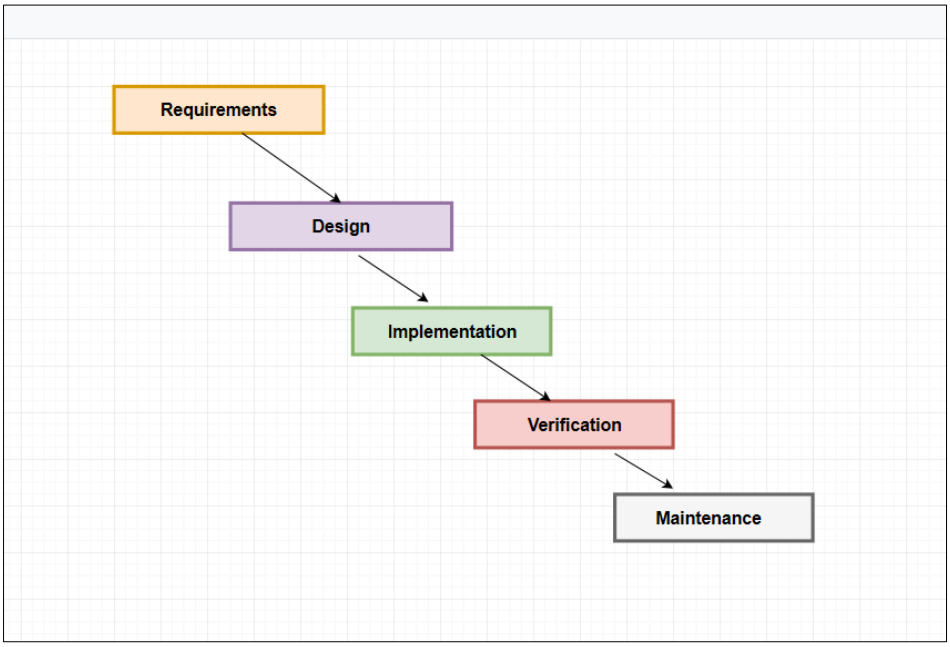
Waterfall Methodology

There are various methodologies when you develop a software application, such as Agile, Scrum, Waterfall etc. Waterfall is the one that is more suitable for a small-size application and it follows the basic structure of sections of the SDLC.

The waterfall model can be described in pseudo code as:

- define the product
- build the software
- integrate the software
- release the product

The waterfall model is a cascading or serial set of processes as shown in the following figure. Each higher level process must be completed and signed off before the next process can begin. You can see the graphic of waterfall is similar to SDLC process.



Copyright and Intellectual Property

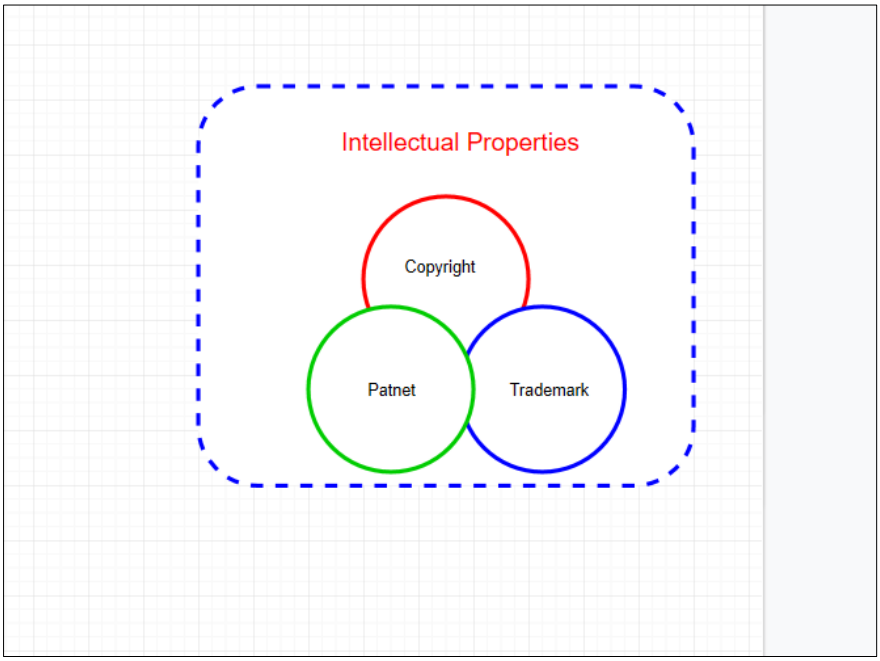
INTELLECTUAL PROPERTY

Intellectual property refers to any intellectual creation, such as **literary works, artistic works, inventions, designs, symbols, names, images, computer code,** etc.

Intellectual property law exists in order to protect the creators and covers areas of **copyright, trademark law, and patents.**

Thus, intellectual property is an umbrella term encompassing both **copyright** and **industrial property,** such as **trademarks, patents, and inventions.**

(Source: free dictionary)



COPYRIGHT

Copyright is under the umbrella of Intellectual Property, every country has its own legislation.

According to the Copyright Council of Australia, the key points of Australian copyright law are:

- Copyright provides creators with an incentive to create new works and a legal framework for the control of their creations.
- Copyright protection is free and applies automatically when material is created.
- There is NO registration system for copyright in Australia.
- Copyright does not protect ideas, information, styles or techniques.
- Copyright does not protect names, titles or slogans.
- There are no general exemptions from copyright law for non-profit organisations.
- There are some situations where copyright law allows people to use copyright material without permission for their own personal use, but these are narrow and specific.
- Australian copyright law applies to actions that take place in Australia, even if the material used was created or first published in another country.

Copyright protects:

- textual material (“literary works”) such as journal articles, novels, screenplays, poems, song lyrics and reports;
- computer programs (a sub-category of “literary works”);

- compilations (another sub-category of “literary works”) such as anthologies – the selection and arrangement of material may be protected separately from the individual items contained in the compilation;
- artistic works such as paintings, drawings, cartoons, sculpture, craft work, architectural plans, buildings, photographs, maps and plans;
- dramatic works such as choreography, screenplays, plays and mime pieces;
- musical works: that is, the music itself, separately from any lyrics or recording;
- cinematograph films: the visual images and sounds in a film, video or DVD are protected separately from any copyright in works recorded on the film or video, such as scripts and music;
- sound recordings: the particular recording itself is protected by copyright, in addition to, for example, the music or story that is recorded;

- broadcasts: TV and radio broadcasters have a copyright in their broadcasts, which is separate from the copyright in the films, music and other material which they broadcast; and

- published editions: publishers have copyright in their typographical arrangements, which is separate from the copyright in works reproduced in the edition (such as poems or illustrations or music).

In Australia, copyright law is set out in the Copyright Act 1968 (Cth). This is federal legislation, and applies throughout Australia. The Commonwealth Attorney-General administers Australian copyright law.

Although the Copyright Act dates from 1968, it sets out how copyright applies for material created both before and after that date. The Copyright Act has been regularly amended since 1968, to bring it up to date with evolving technologies and concerns. In addition to dealing with copyright rights, the Copyright Act also deals with performers’ rights and the “moral rights” of individual creators.

In many cases, Australian courts have had to decide how the Copyright Act is to be interpreted and applied. Therefore, if you want to know how copyright law will apply to a particular situation you are facing, you will generally need to be aware not only of what is in the Copyright Act but also of how courts have approached the issues and interpreted the Act.

(Source: Australian Copyright Council, " An Introduction to Copyright in Australia *")*

The following is a link to the Copyright Act:

- https://www.legislation.gov.au/Details/C2017C00180

COPYRIGHT IN ICT

Software copyright – scripting and software applications are covered by copyright law. Unless otherwise specified you are not allowed to:

- Make copies as gifts for friends or family members
- Sell copies for profit
- Give multiple users access to individually licensed products
- Lend copies to unlicensed users

When you are creating a software application, you CANNOT:

Use code that has been patented by another programmer without permission.

Use a logo that has been trademarked by another designer without permission.

Use a system that has been designed and licenced by another person without permission.

Search engine images - Images returned by search engines do not belong to the search engine and are not free to use. The search engine has included them from a number of websites. All of the major search engines provide a link to the website that the original image is from. If you want to use an image you have found using a search engine, always check who it belongs to.

TRADEMARK

A **trademark** (also written **trade mark** or **trade-mark**) is a type of intellectual property consisting of a **recognizable** sign**,** design**, or** expression which identifies products or services of a particular source from those of others.

PATNENT

A **patent** is a form of intellectual property that gives its owner the legal right to exclude others from making, using, selling, and importing an invention for a limited period of years, in exchange for publishing an enabling public disclosure of the invention.

SCRIPTING FOR CYBER SECURITY

Security has become a big issue in ICT industry. There are six main programming languages to learn for Cyber Security: C and C##, Python, JavaScript, PHP and MySQL.

We have followed the list to select a scripting for our learners

- The scripting must have an extensive library of powerful packages that supports Rapid Application Development (RAD) which is a testing procedure.
- Clean syntax code and modular design, the learners are just Cert IV level, so the syntax must be easier to learn.

- Automatic memory management and dynamic typing capability
- Mixed code environments to combine different programming languages.

Python goes to the opt list in comparison with the others.

WHAT IS PYTHON SCRIPTING

Python is an interpreted high-level programming language for general-purpose programming.

- Multi-purpose (Web, GUI, Scripting etc.)
- Interpreted
- Object Oriented
- Focus on productivity

WHO USES PYTHON

The following organisations use Python program for their products:

- PBS
- NASA
- Library of Congress
- The ONION

The following top 8 world-class software that use Python

- Industrial Light and Magic
- Google
- Facebook
- Instagram
- Spotify
- Quora
- NetFlix
- Dropbox
- Reddit

HISTORY OF PYTHON

- Created in 1989 by Guido Van Rossum
- Python 1.0 released in 1994
- Python 2.0 released in 2000
- Python 3.0 released in 2008
- Python 3.8 is the latest stable version. All examples in this guide will work with any version higher than 3.0

MAIN CHARACTERISTICS OF PYTHON SCRIPTING

Python scripting provides many features, but the main features are listed as following:

It is an Object-Oriented language – Python is a scripting language that supports object oriented concepts, including classes and objects.

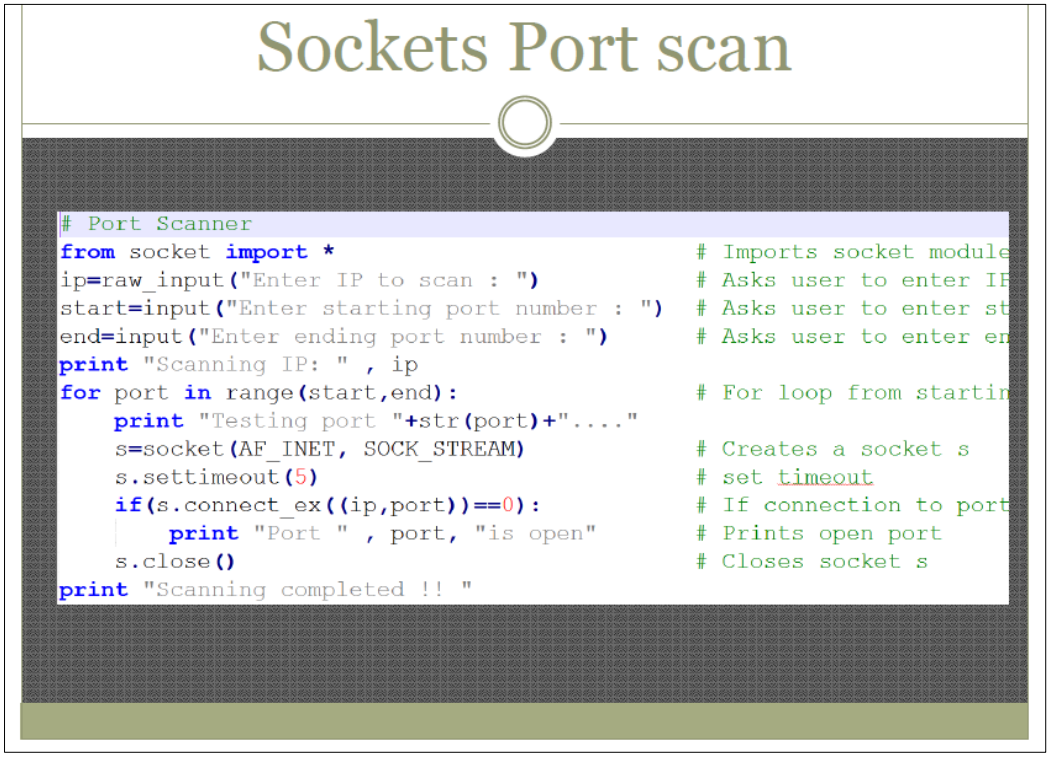
Cross-platform program - Python can run equally on different platforms such as Windows, Linux, Unix and Macintosh etc. So, we can say that Python is a portable language. We use a Raspberry pi and the GrovePi framework on a Linux system for the project.

Interpreted - Python is an interpreted language i.e. the interpreter executes the code line by line at a time. This makes debugging easy and thus suitable for beginners.

Free and open source – You can Python for free from the official website (https://www.python.org/downloads). It is an open source program which means the source code is available.

There are others including GUI programming language, extensible, integrated, and it has a large standard library.

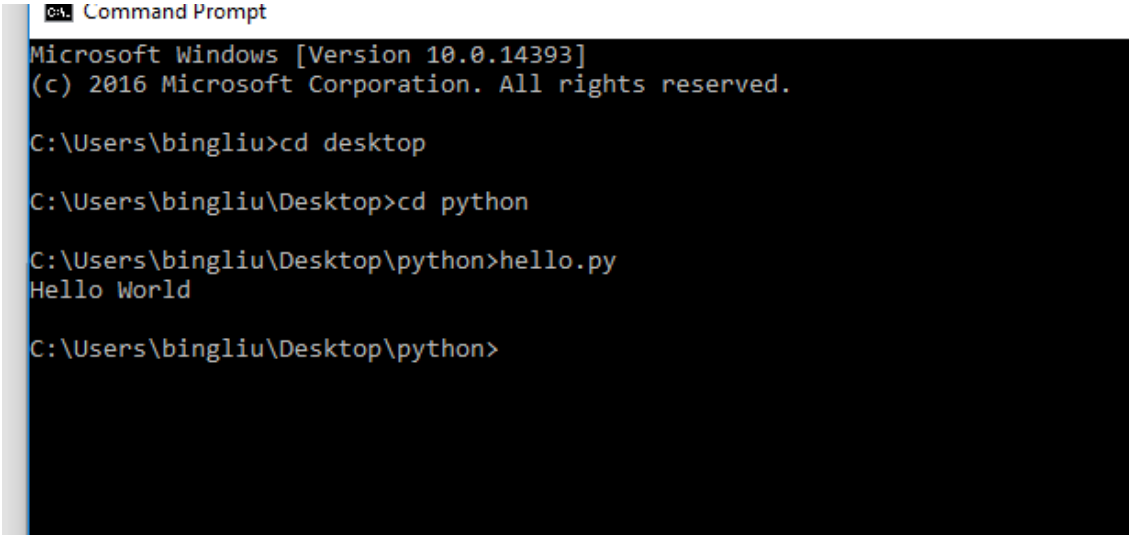
EXAMPLE OF PYTHON CODE IN SECURITY



SYNTAX OF PYTHON

- Using Keyword “print” to display a message on the screen
- Using “import” to get the package into your program

Using command line to execute a file



PYTHON IDES

In order to make you more productive, there are best 6 Python IDEs to use:

- PyCharm.
- Eclipse with Pydev.
- Wing **IDE**.
- Komodo **IDE**.
- Eric **Python IDE**.
- Sublime Text 3.

The top of the list is PyCharm which is a free downloaded program, it makes coding easier, It is created and maintained by JetBrains which is renowned for making remarkable IDEs and developer tools.

FEATURES IN PYCHARM

- Tons of plugins and integrated terminals.
- Intelligent code completion
- PEP-8 checks and recommendations improve the code quality.
- Intuitive Project navigation.
- Graphical debugger and test runner.
- Smart Refactoring
- Database Support
- Remote Development Capabilities
- Web development framework support
- Version control
- It supports numerous of Python libraries
- On-the-fly error checking and quick-fixes
- Code folding
- Unit Testing

- Line Numbering

RESOURCE ON MOODLE:

- Introduction (ppt)

LINKS FOR STUDENTS

- https://www.youtube.com/watch?v=i-QyW8D3ei0
- https://www.youtube.com/watch?v=BGSgZ1J8-yQ
- https://www.w3schools.com/python/python_intro.asp
- https://www.youtube.com/watch?v=hEgO047GxaQ