

Specific digital tools

It is expected that you are familiar with the following image editing software tools:

- crop
- magic wand
- copy
- paste
- save as
- feather
- marquee
- Gaussian blur
- inverse selection (CTRL+SHIFT+I)

Make a digital journal

Tools:

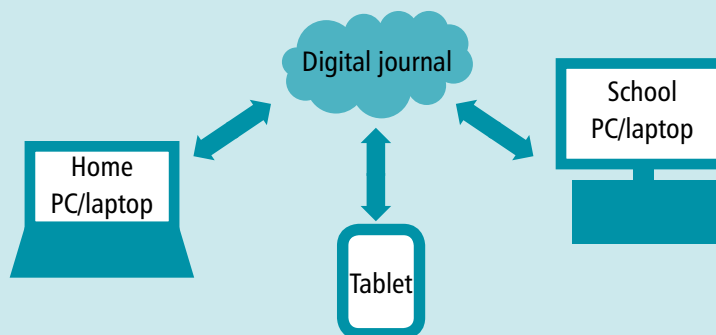
- Microsoft *OneNote*
- Internet access
- *SkyDrive*
- Google *Drive*
- a web browser (Google *Chrome* is recommended).

Note: These techniques, although modelled using Microsoft software solutions, can easily be adapted for use with any suitable application.

What is a digital journal?

A digital journal is a very useful tool to help you make notes and organise your projects. You can use it to embed hyperlinks to useful websites and to files you have created. You can also use it as a platform for presenting your ideas to a stakeholder and collecting data in response. It doesn't matter if you don't have the software installed on your computer at home; all you need is a web browser and a good Internet connection.

You can access your digital journal from anywhere there is an Internet connection, so you can seamlessly work between home and school.

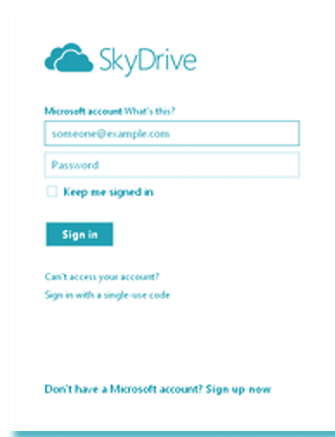


Task: Setting up your digital journal (1)

You will use Microsoft's SkyDrive for this task.

To access SkyDrive you will need to set up a *Windows Live* account. You may already have one – if you use *Hotmail* or *Xbox Live* for example.

1. Go to <http://skydrive.com>
2. Sign in using your *Windows Live* account.



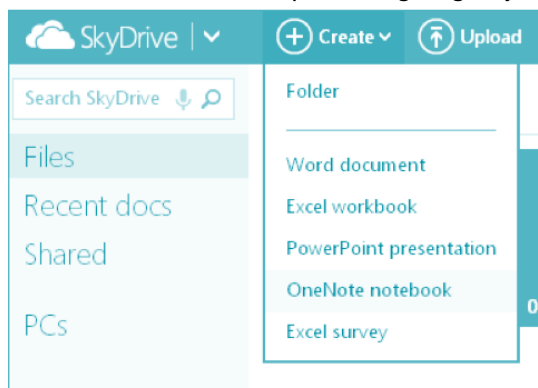
Note: You need *Windows 7* to install SkyDrive for Windows on your computer.

This is the home screen for all your SkyDrive documents.



For help with using SkyDrive go to: <http://office.microsoft.com/en-gb/web-apps-help/get-started-with-office-web-apps-HA101785172.aspx>

3. Create a new **OneNote notebook** and name it 'Conceptual Design digital journal'.



be specific places to which you can save files, such as H or Home drive. You might have a personal drive with its own identifier like your username so no one else can access your files. There might also be a shared drive where your teacher can save documents that you can retrieve. These 'drives' form part of a network where different people have different permissions, in order to keep files secure. You might also have been taught certain ways in which to save your files and folders so that they are easy to find, such as using subject codes or informative titles, rather than saving them as Doc1.

Here is an example of a printscreen you might include in your report to demonstrate your understanding of file management. Remember you must explain your printscreen and don't forget to reference (see Section Seven).

 2.40 EXTERNAL Information Systems	13/08/2012 1:37 p....	File folder
 2.41 Database	5/06/2012 10:41 a....	File folder
 2.43 Media Project	19/10/2012 2:38 p....	File folder
 US2789 DTP	30/04/2012 9:45 a....	File folder

Task: Explaining file management

Explain the file management processes you use at school or that are used in the organisation discussed in your report by answering these questions using full sentences.

1. Where are files saved to?

2. What other drives do you / the organisation's staff have access to and what sort of access do you/they have (e.g. read-only, save/edit)?

3. What reasons are there for different people having access to different files/folders?

4. Give examples of the ways files and folders are saved to make them easy to find. (This is a great place for a printscreen in your report to help explain your point. See Section Seven below about referencing.)

 Report tip

Remember this section of the report can contribute only to an 'Achieved' result. Write in full sentences to show the marker you understand what sort of file management takes place in your chosen organisation. Avoid writing general hints on what should or could be done; write only about what *does* take place in your organisation, whether it is good or bad. You are not required to write about strengths/weaknesses or make suggestions on how things can be improved. As a guide, this section should take a maximum of half a page in your report.

Section Two: Input, output, storage, retrieval and manipulation

This section of the report, like Section One, can contribute only to an 'Achieved' result; so it should be short and kept related directly to your chosen organisation.

As was discussed briefly in the introduction to this chapter, all information systems need ways to input, store, retrieve and manipulate the data within them. These very actions are what make it into a system, as they all work together to manage the sharing of information.

Let's look at some examples.

Student management system

Your school will have some form of Student Management software such as KAMAR or MUSAC. The information system is used to record all the important information about you as a student, such as your contact details, exam results, medical information and attendance. This information is then used by several different people, such as administration staff checking who is absent from school or your teachers entering your grades so they can be sent to NZQA.

Business email system

An example in a business situation might be the email system used. Information is input into an email that might be sent out to one or more people. There might be attachments to the message, which might in turn be printed out or which might be projected onto a screen in a meeting. If an employee uses software such as Microsoft Outlook, he or she might set up different folders where important messages the employee might want to follow up on at a later date can be saved. Messages can be retrieved straight to a computer or perhaps to a handheld device such as a smart phone or iPad, allowing the employee to work outside the office. Emails can be easily manipulated by just replying to the person who sent a message, forwarding it to a different person or by adding or deleting attachments.

- 6. Time management** – putting effort into every lesson will be easier if, at the start of each lesson, you determine what task(s) you will focus on completing. A deadline is the date a task should be completed by. If you are given three weeks for an assignment, there is little chance that you will complete it if you procrastinate until the day before the deadline. Get into the habit of using class (and home) time wisely.

The better you meet the six requirements above, the more chance you have of Achievement with a 'Merit' or 'Excellence' grade.

Scenario

Offline Helpers is a youth enterprise business set up by digital technologies students at Erehwon High School. The aim of the business is to earn money by providing assistance to the local community with issues related to computer hardware problems (maintenance) and the use of personal electronic devices including laptops, cell phones, iPods, iPads and GPS devices (tutorial).

The 'office' address for the business is 132 Patapu Street, Erehwon. Most clients contact the business through its website, www.erhwonofflinehelpers.co.nz or email offlinehelpers@xtra.co.nz or via the cell helplines: 035 633 546 4357 (maintenance); 035 633 546 8887 (tutorials).

The six student directors (the stakeholders) of *Offline Helpers* are:

- Ruby Darroch – Managing Director
- Sean Thaw – Financial Manager
- Jarrod Cald – Maintenance Co-ordinator
- Jessica Yent – Tutorial Co-ordinator
- Sam Williams – Tutor
- Ashley Williams – Technician.

Maintenance charges are:

- Travel expense – 50c per kilometre
- Parts, including postage and packaging – cost plus 30%
- Labour fee – \$25 per hour.

Tutorial charges are:

- Travel expense – 50c per kilometre
- Labour fee – \$15 per half hour or part thereof.

Directors are paid:

- Wages: \$10 per half hour for maintenance or tutorial labour. Administrative hours are logged under Tutorial hours.
- Wages: \$5 per business meeting attended.
- Expenses:
 - Travel – 50c per kilometre
 - Cell phone top-up - \$10 per month.

Tax is deducted on wages at 20% for directors who earn total wages less than \$500 a month and 33% for directors who earn total wages of more than \$500 a month. Profits will be shared equally at the end of each financial year (that is, annually). GST is to be ignored for the purpose of this chapter.

Most maintenance work and tutorials are carried out at clients' homes between 4 p.m. and 9 p.m.

Business meetings are held in a spare room attached to the Williams' garage. \$25 a month is paid to Mr Lew Williams to cover Internet and electricity costs. The students communicate with one another and with clients through cell phones or the Internet.

Other business expenses include cleaning equipment for the business 'office', and refreshments supplied for meetings.

The business has the following assets:

- Laptop \$1200
- Desk and chairs \$500
- Cash at bank \$400

Each director has invested \$350 in the business. Wages are paid monthly. Profits will be split equally between the partners at the end of each financial year.

Task 1: Spreadsheet

Over the first month Sean gathers the following financial information.

Income received:

Maintenance fees	\$1,575.00
Parts	\$462.00
Tutorial fees	\$930.00

Expenses:

Labour wages	\$1,880.00
Meeting wages (2 meetings)	\$60.00
Cost of parts	\$325.00
Packaging and postage (parts)	\$72.00

Expenses (continued):

Travel expenses	\$120.00
Meeting expenses	\$28.00
Rental fee	\$25.00
Cell top-ups	\$60.00
Kitchen expenses	\$26.00
Cleaning expenses	\$14.00

Part (a): Planning the worksheet

Ans. p. 207

Sean, the treasurer and a stakeholder in *Offline Helpers*, asks you to plan and design an electronic worksheet that would allow him to keep track of the income and expenditure of the business on a monthly basis. He will need to share this information with his colleagues at *Offline Helpers*. The staff members of *Offline Helpers* are the target audience. Sean specifically asks that you advise:

- the name of the software you would recommend to create this worksheet
- three reasons that this software is considered suitable for the task
- four software tools that can be used
- a print screen capture showing how each tool is activated (instructions on how to create and crop a print screen capture are provided below)
- how each tool will assist with the completion of the worksheet
- about the ethical and privacy issues that must be considered when using the information and worksheet.

Print screen captures

Print screen captures provide a pictorial view of the data shown on a computer screen. They can be pasted into a word-processing document, cropped and resized. The example below captures the location of the *Merge & Centre* button located on the MS Excel *Home* ribbon.

- Hardware/software compatibility: web page elements, for example headers, forms, graphics and shopping carts, are more likely to work correctly across a broad spectrum of home and business computers.
- Cost effective: the cost of creating, hosting and maintaining a website is predictable. Potential customers are less likely to become frustrated with using the web site and therefore should stay on the site longer. The longer they stay, the more likely it is that they will purchase something.

Disadvantages are that:

- it is harder to provide a unique point of difference that allows a web page to stand out from others in the same type of business
- the business may be perceived as unimaginative or 'stodgy' because it follows conventions.

Task 2

Part (a): Web standards and conventions: terminology

1. Use your knowledge and the Internet to match the following web terms with their meaning in the following table. To help you get started, eight of the terms have already been matched with their meanings. These eight terms are highlighted in the list below.

Absolute/relative positioning	HTML	Semantically correct code
Branding	HTML – opening and closing tags	Sign/Log in
Breadcrumbs	Internal links	Sign/Log out
Buttons	JavaScript	Site map
Code validation	Layouts	Title tag
Company logo	Liquid layouts	URL
CSS	Menu tabs	Validating code
Doctype	Meta data	W3C
Download friendly	Multimedia	Web content
Drop shadows	Navigation bars	Web interaction
Encryption	Print friendly	Web style or presentation
External links	Rotating elements	Wire framing
Home	Search	www

You can use a web search engine such as Google to increase the depth of your knowledge. For example I keyed in 'web layouts' and was impressed by the information displayed at the website <http://designshack.net/articles/layouts/10-rock-solid-website-layout-examples>

Term	Meaning
JavaScript	A computer program that runs within the browser to make elements within a web page interactive. For example, if a web visitor clicks a button titled 'Reset form', the program will activate the query 'Are you sure that you wish to reset the form?' and provide Yes/No options. JavaScript allows users to sign into specific web-based accounts, such as Facebook, personal banking and online retail sites.

Demonstrate understanding of advanced concepts from computer science

This chapter covers knowledge of the following advanced concepts from computer science: binary coding, error control coding, encryption, and usability heuristics. Some associated concepts – hexadecimal coding and data compression – are also considered.

Bits and pieces – binary coding

Binary

Computers work by changing voltages within circuits – a pathway can either be turned on (positive voltage) or off (no voltage). Humans use the binary number system to represent the notion of on/off in the circuits: the number '1' represents being on, and '0' represents being off. Each digit is called a 'bit'. By combining these bits into groups, larger numbers can be made – a group of 8 bits is a byte – and multiple bytes are expressed in terms of Kilobytes, Megabytes, Gigabytes and Terabytes.

Binary number table

Binary numbers				Decimal value	Hex value
8s column	4s column	2s column	1s column		
0	0	0	0	0	0
0	0	0	1	1	1
0	0	1	0	2	2
0	0	1	1	3	3
0	1	0	0	4	4
0	1	0	1	5	5
0	1	1	0	6	6
0	1	1	1	7	7
1	0	0	0	8	8
1	0	0	1	9	9
1	0	1	0	10	A
1	0	1	1	11	B
1	1	0	0	12	C
1	1	0	1	13	D
1	1	1	0	14	E
1	1	1	1	15	F

Notice the extra column of hexadecimal values (or *Hex*) – this is a base-16 counting system that makes dealing with binary much easier.

The table shows that for a group of 4 *bits* or binary numbers, there are 16 possible combinations (including 0). A group of 8 bits (also known as a *byte*) can be combined in 256 different ways. Working from the far right of a binary number (called the least significant bit, and with a decimal value of 1), each bit is worth twice the value of the previous bit. A byte can also be shown by two hex digits, ranging from 00h (for 00000000) to FFh (which is 255, or 11111111).

Note: A small 'h' after a number indicates it is hexadecimal, not decimal.

Task: Binary and hexadecimal conversion

The table below shows the column values for the largest possible one-byte number.

1. Calculate the decimal value for the following one-byte binary numbers. The first has been done for you.

	128	64	32	16	8	4	2	1		Decimal
	1	1	1	1	1	1	1	1	$128 + 64 + 32 + 16 + 8 + 4 + 2 + 1$	255
a.	0	1	0	1	1	1	1	0		
b.	1	1	0	0	1	1	0	0		
c.	0	0	0	0	1	0	1	0		
d.	1	0	0	0	0	0	0	0		
e.	1	0	0	0	0	0	1	1		
f.	1	1	0	1	0	0	0	1		
g.	0	1	0	0	0	0	0	0		

2. How can you quickly see if a binary number is odd or even?

3. One neat aspect of hexadecimal is that to calculate the value of a byte, each half-byte (or 'nibble'; yes, seriously – half of a byte is 'a nibble') is worked out independently, and then put together. So 00000000 is 00h (because the first nibble – $0 + 0 + 0 + 0 = 0$, and the second nibble, $0 + 0 + 0 + 0 = 0$; and the two nibbles joined together give 00 – with a small 'h' to remind us this is hex) and 11111111 is FFh (because the first nibble is (from the table above) $8 + 4 + 2 + 1 = 15$, and the Hex notation for 15 is 'F'; and the second nibble is ...?).

Use the binary-to-hex table to calculate the following bytes in hex:

- a. 11110000 _____ 'h'
- b. 10001000 _____ 'h'
- c. 00010001 _____ 'h'
- d. 10101010 _____ 'h'
- e. 01010101 _____ 'h'

Construct an advanced computer program for a specified task

This chapter covers knowledge and skills needed to create, document, and test/debug an advanced computer program from given tasks. The chosen language is **Python**, which may be freely installed on any computer. The chapter is divided into progressively more advanced topics, with each topic containing blocks of theory and practical exercises. It is assumed that the student has previously studied Technology 1.46 (programming), though no experience with the Python language is needed.

To achieve the standard you must follow a plan to create a program, set out the program code clearly, and document the program with comments, and test/debug the program to make sure it works with expected input.

For 'Merit' you must follow the plan independently, choosing variable names and types well, and modules (functions) should have well-chosen parameters. The variable and module names should describe their function, and comments should accurately describe the function and behaviour of code. The program will need to be tested/debugged in an organised way, so that both expected and boundary cases are well handled.

For 'Excellence', the keyword is *efficiently*, so the program must be well structured and logical and the way variables are used must increase the flexibility and robustness of the program. The code must be set out concisely and must include comments that explain and justify decisions. Testing needs to be comprehensive (covering all cases), organised, and time-effective, so that the program works on expected, boundary, and invalid inputs.



Tip

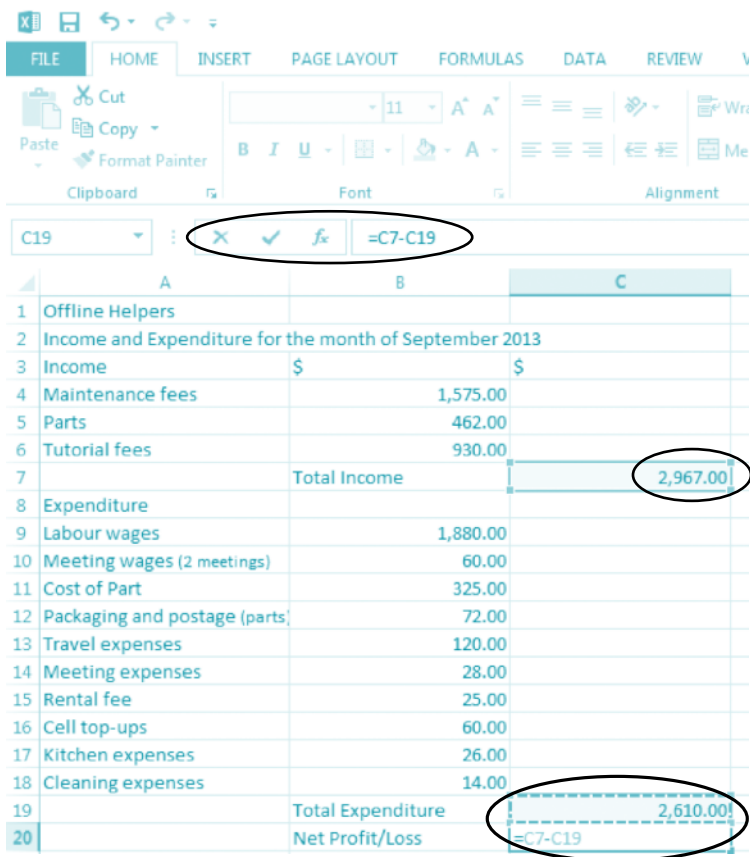
In this chapter, the term 'program' will be used to describe a completed piece of code written in the *Python* language, whilst the term 'application' refers to a tool that has been installed on the computer, and is used to write or run a Python program. These definitions are artificial, and are used to make it easier to understand the text.

Introduction to the Python language and programming



Python is an **interpreter language**, meaning that programs written in Python need to run using an application which understands the Python language. The *terminal* application on Mac computers has a built-in Python interpreter, and it is not difficult to install an interpreter on a PC (Windows) machine and run Python programs using the *Command Prompt* application. An **IDE** (Integrated Development Environment) is an application used to write programs that is equipped with a host of testing, writing, and debugging tools. This chapter uses

A print screen capture showing how the formula to subtract Expenditure from Income is keyed appears below:



How the Formula software tool will assist with the completion of the task.

Formulas accurately complete a calculation (provided the correct cells and mathematical symbols are used). If data within the formula is subsequently edited (for example, numbers amended or another expense (row) added) the calculation will be automatically updated by the MS Excel software.

Software tool No. 3 to be used.

Sorting data

A print screen capture showing how the Sorting data software tool is activated appears below:

