NSW Education Standards Authority

Higher School Certificate Course Specifications

Enterprise Computing

NESA acknowledges Traditional Owners and Custodians of Country throughout NSW, and pays respect to Elders past and present. NESA recognises Aboriginal Peoples' continuing Cultures and Connections to lands, waters, skies and Community.

© 2023 NSW Education Standards Authority

The documents on the NSW Education Standards Authority (NESA) website and the NSW Curriculum website contain material prepared by NESA for and on behalf of the Crown in right of the State of New South Wales. The material is protected by Crown copyright.

These websites hold the only official and up-to-date versions of the documents available on the internet. Any other copies of these documents, or parts of these documents, that may be found elsewhere on the internet might not be current and are not authorised. You cannot rely on copies from any other source.

All rights are reserved. No part of the material may be:

- reproduced in Australia or in any other country by any process, electronic or otherwise, in any material form
- transmitted to any other person or stored electronically in any form without the written permission of NESA except as permitted by the *Copyright Act 1968* (Cth).

When you access the material, you agree:

- to use the material for research or study, criticism or review, reporting news and parody or satire
- to use the material for information purposes only
- not to modify the material or any part of the material without the written permission of NESA
- to reproduce a single copy for personal bona fide study use only and not to reproduce any major extract or the entire material without the permission of NESA
- to include this copyright notice in any copy made
- to acknowledge that NESA is the source of the material.

The documents may include third-party copyright material such as photos, diagrams, quotations, cartoons and artworks. This material is protected by Australian and international copyright laws and may not be reproduced or transmitted in any format without the copyright owner's permission. Unauthorised reproduction, transmission or commercial use of such copyright material may result in prosecution.

NESA has made all reasonable attempts to locate the owners of third-party copyright material. NESA invites anyone from whom permission has not been sought to contact the Copyright Officer.

Special arrangements applying to the NSW Curriculum Reform

As part of the NSW Curriculum Reform process, NESA grants a limited non-exclusive licence to:

- teachers employed in NSW government schools and registered non-government schools
- parents of children registered for home schooling

to use, modify and adapt the NSW syllabuses for **non-commercial educational use** only. The adaptation must not have the effect of bringing NESA into disrepute.

Note: The above arrangements do not apply to private/home tutoring companies, professional learning service providers, publishers, and other organisations.

For more information on the above or for **commercial use or any other purpose**, please contact the Copyright Officer for permission.

Email: copyright@nesa.nsw.edu.au

D2022/519328

Table of Contents

Introduction

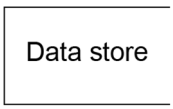
Enterprise Computing Course Specifications are an integral part of the course content for Year 11 and Year 12 and indicate the depth of study required for some concepts in the *Enterprise Computing 11–12 Syllabus*. The *Enterprise Computing 11–12 Syllabus* must be applied in conjunction with the Enterprise Computing Course Specifications.

System and Data Modelling Tools

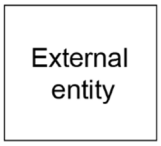
Data flow diagrams

Symbols

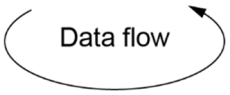
A circle represents a process. A process uses input(s) to generate output(s).



A data store can be an electronic file or non-computer storage.

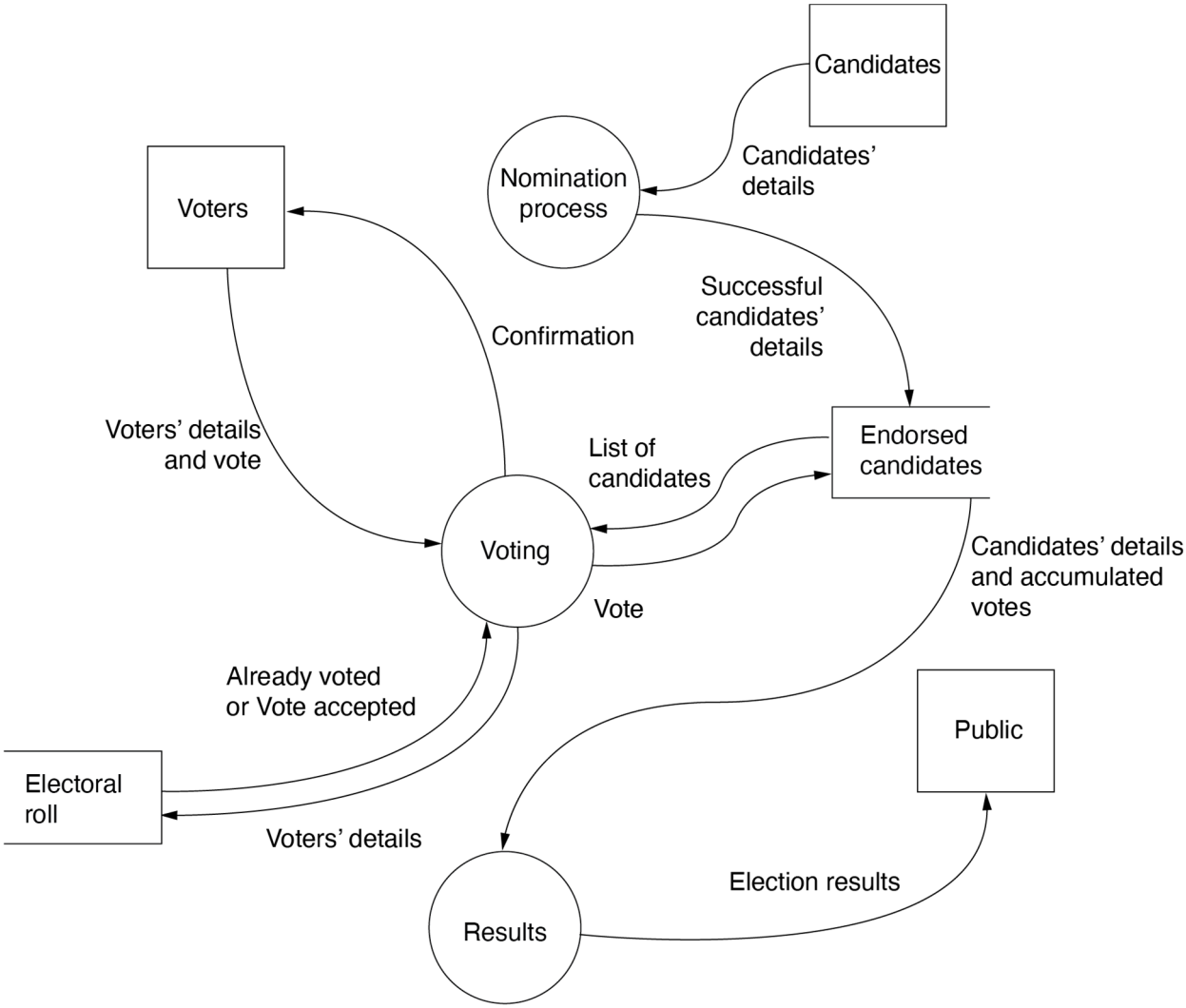


An external entity can be any person, organisation or element that provides data to the system or receives data from the system.



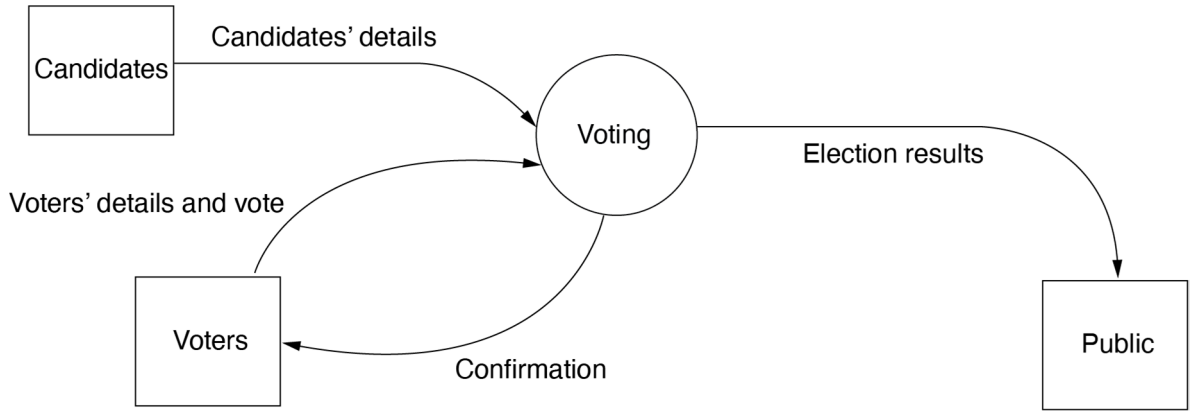
A labelled, curved arrow represents the flow of data between processes, data stores and external entities.

The following data flow diagram models a voting system.



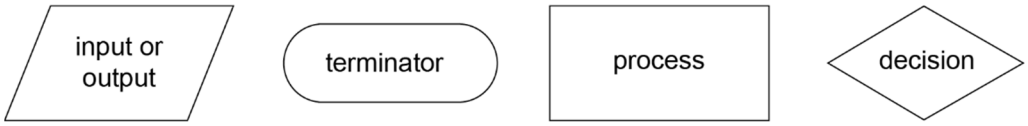
Level 0 data flow diagram

Level 0 data flow diagrams represent an overview of the entire system and do not show data stores or internal processes. The following represents a Level 0 data flow diagram for the voting system.

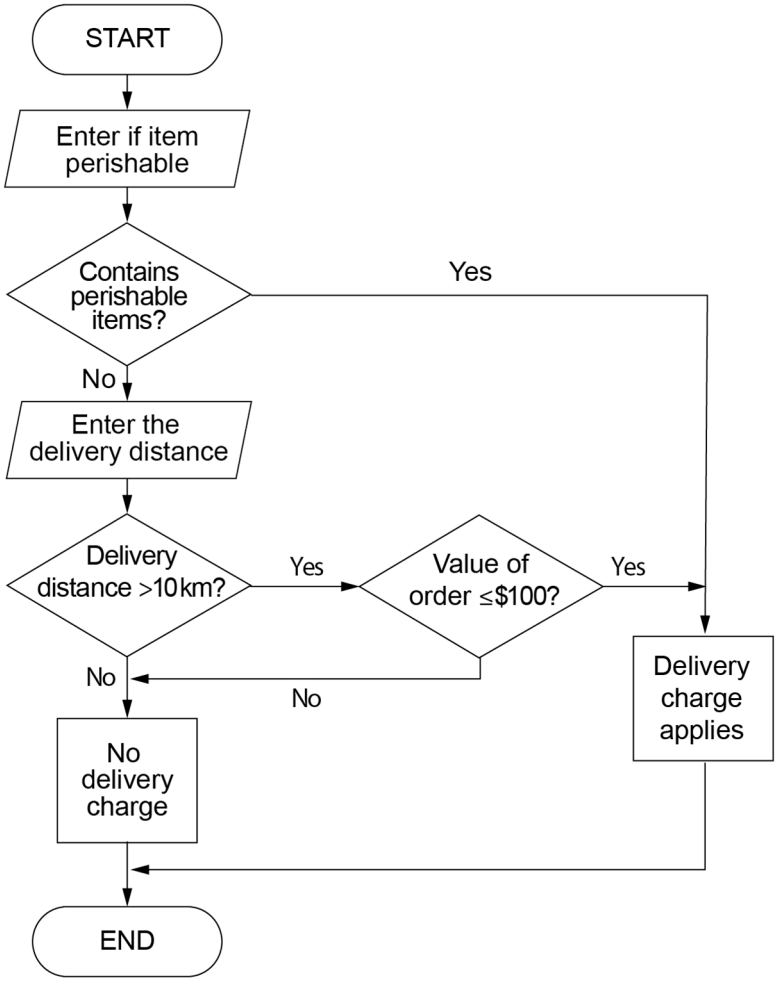


Flowcharts

Flowcharts are diagrams that represent logic and are read from top to bottom and left to right.
The following symbols are used.



The following flowchart represents the logic to determine the application of a delivery charge to perishable and non-perishable items.

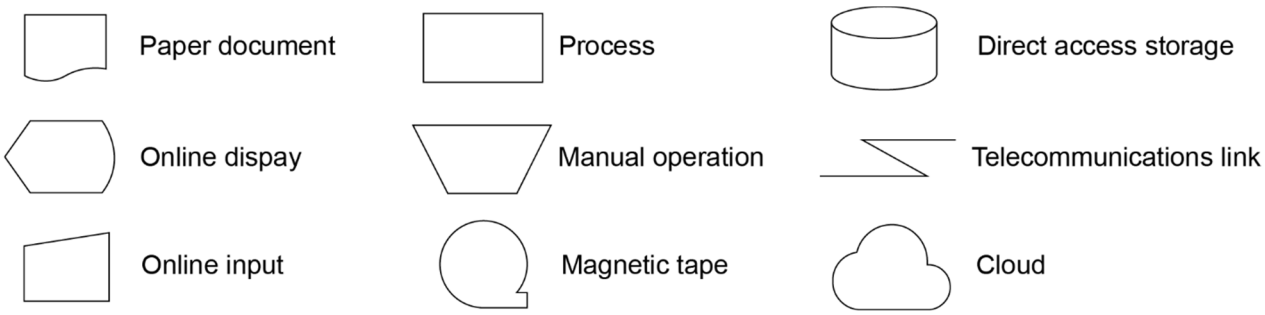


NOTE: The arrows in the flowchart are used to show the direction of flow.

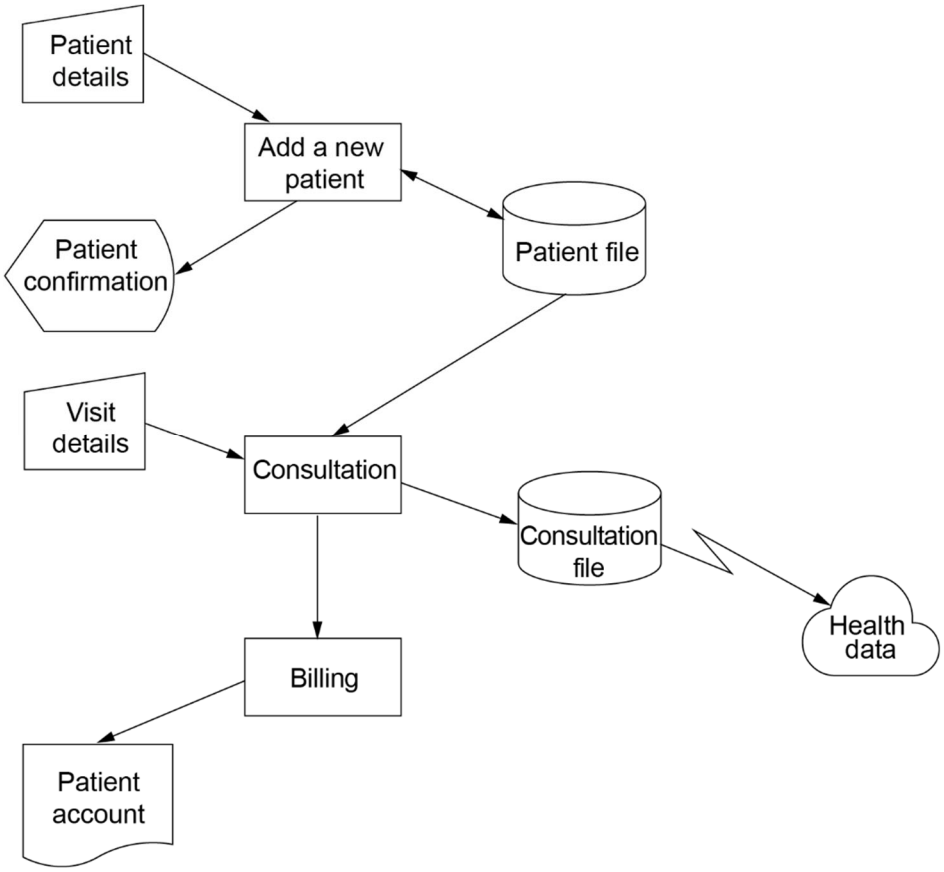
System flowcharts

System flowcharts are used to represent the main processes and devices in a system.

Symbols include the following.



The following system flowchart represents part of a system used by a doctor in managing patient information.

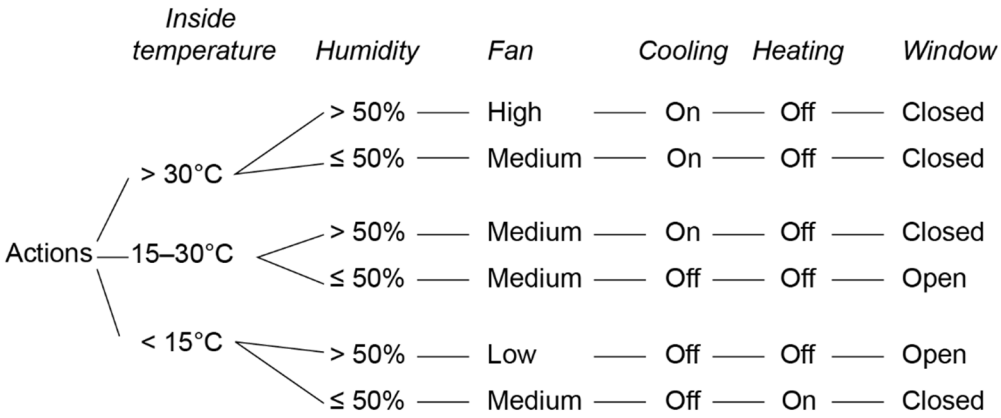


NOTE: The arrows in system flowcharts are used to show the direction of data between each of the symbols.

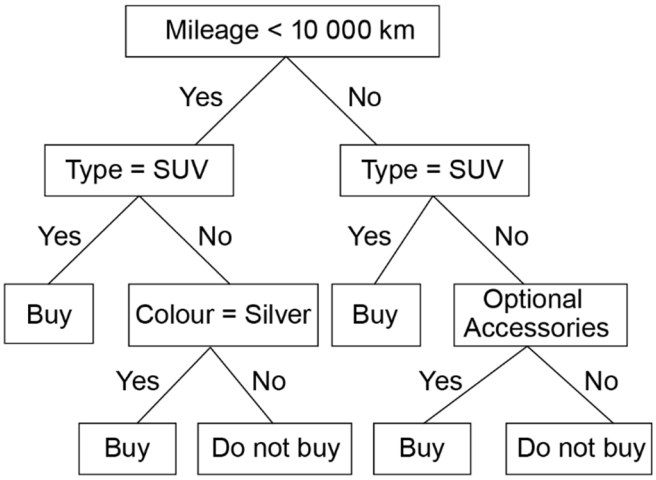
Decision trees

A decision tree is a that represents all possible combinations of decisions and their resulting actions. Branches are shown to describe the eventual action diagram depending on the condition at the time. Each decision path will lead to either another decision or a final action.

The following decision tree shows the rules in controlling the comfort levels within a ‘smart’ house.



The following diagram shows another way to represent a decision tree.



Data dictionary

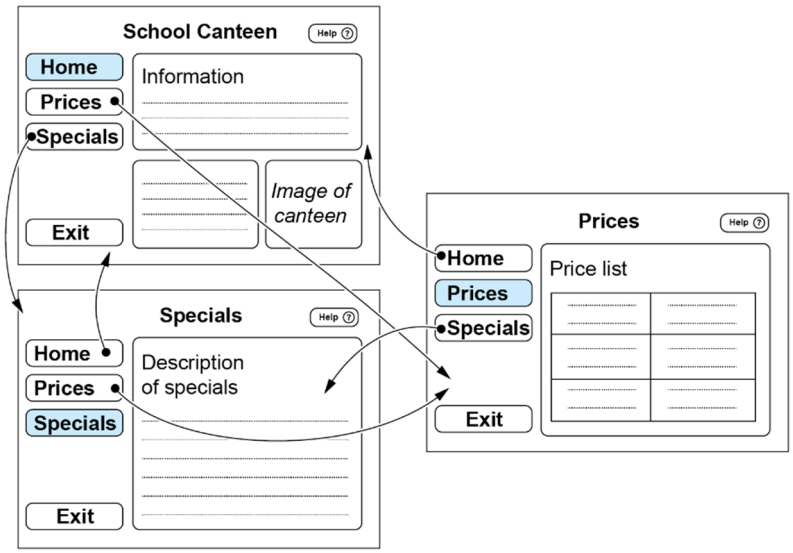
A data dictionary provides a comprehensive description of each field in a database. This commonly includes field name, data type, data format, field size, description and example. An example of a data dictionary is shown.

Field name	Data type	Data format	Field size	Description	Example
UserID	Text	XXXNNNN	7	Unique seven-character field with 4 digits	XYZ1539
FirstName	Text	XXX…XXX	25	First name of employee	Jo
Surname	Text	XXX…XXX	25	Surname of employee	Smith
DOB	Date	DD/MM/YYYY	10	Date of birth	15/07/1982
HourlyPayRate	Currency	$#####.##	9	Rate of pay expressed in dollars per hour	$34.50
Height	Real	#.##	3	Height in metres, with two decimal places	1.58
FeesPaid	Boolean		1	Y or N for Yes or No	Y

Storyboards

A storyboard shows the various interfaces (screens) as well as the links between them.

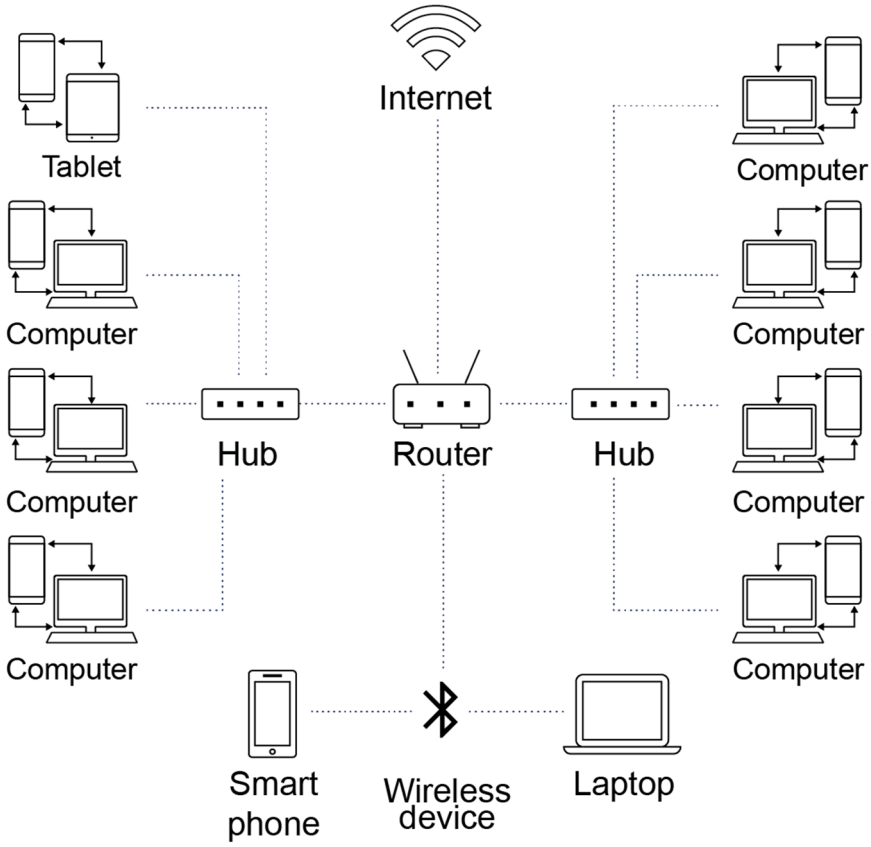
The following storyboard shows the relationship between three pages of information aimed at promoting a school canteen on a website.



Network diagram

Students are expected to document a network using symbols to represent the component devices (nodes) and how they are connected. Network diagrams are also known as network maps.

The following network diagram shows a network which includes a variety of devices. Different software packages represent the devices using different symbols. Students should clearly label all devices on their network diagrams.

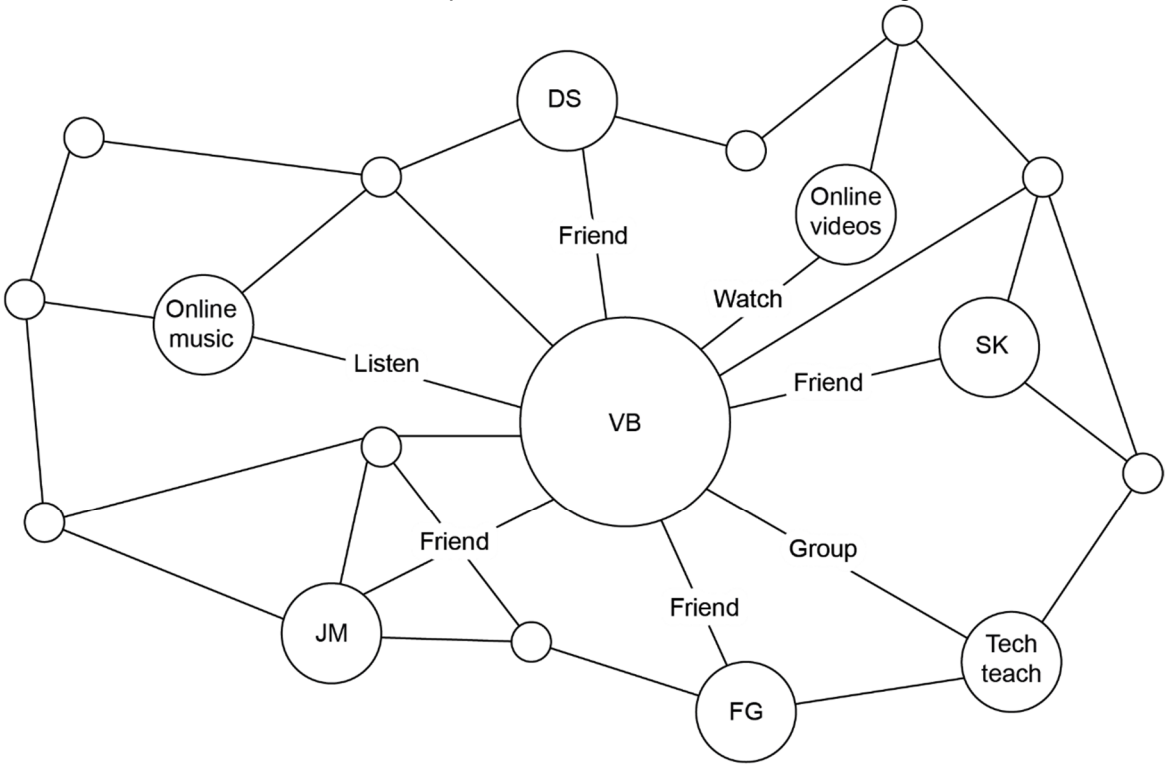


Graph and network theory

Graph and network theory can be applied in the design of social networks. The following symbols are used.

Symbol	Representation
	Links (edge): used to connect nodes (vertices), groups of nodes or clusters
	An individual or category (node/vertex). Size may be used to indicate size of a dataset where appropriate.

The diagram represents VB's social network. DS, SK, JM and FG are all individuals in VB's network. The categories, Online music, Online videos and Tech teach are also part of this social networking group. The labels on the links show the relationship between VB and individuals and categories.

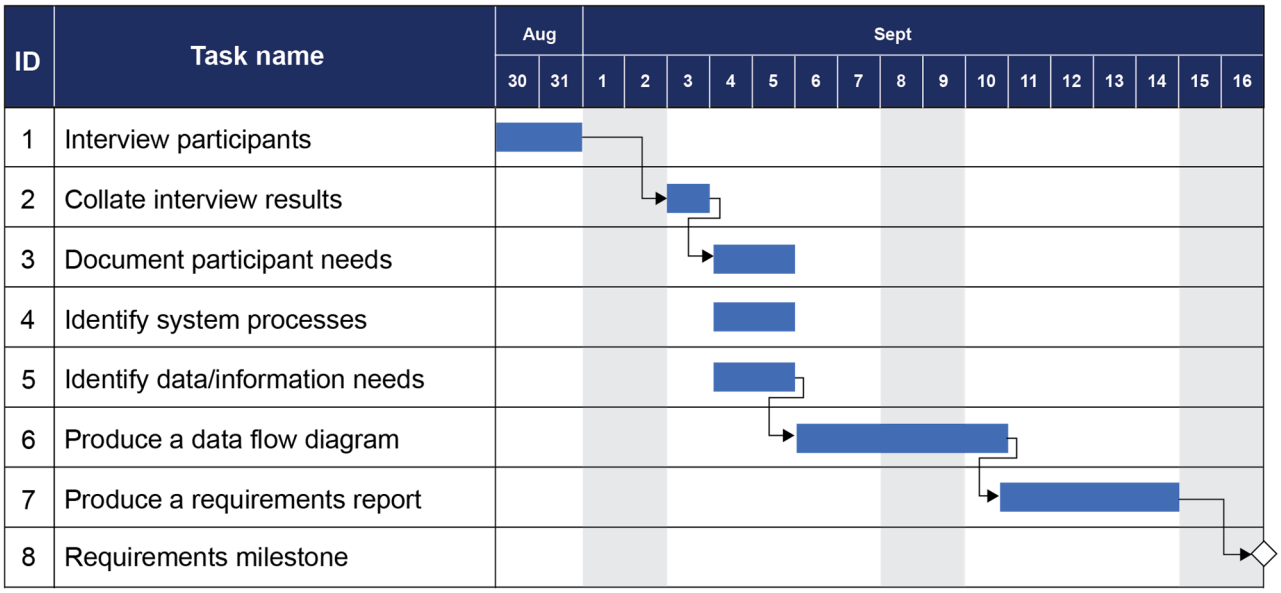


Project Management Tools

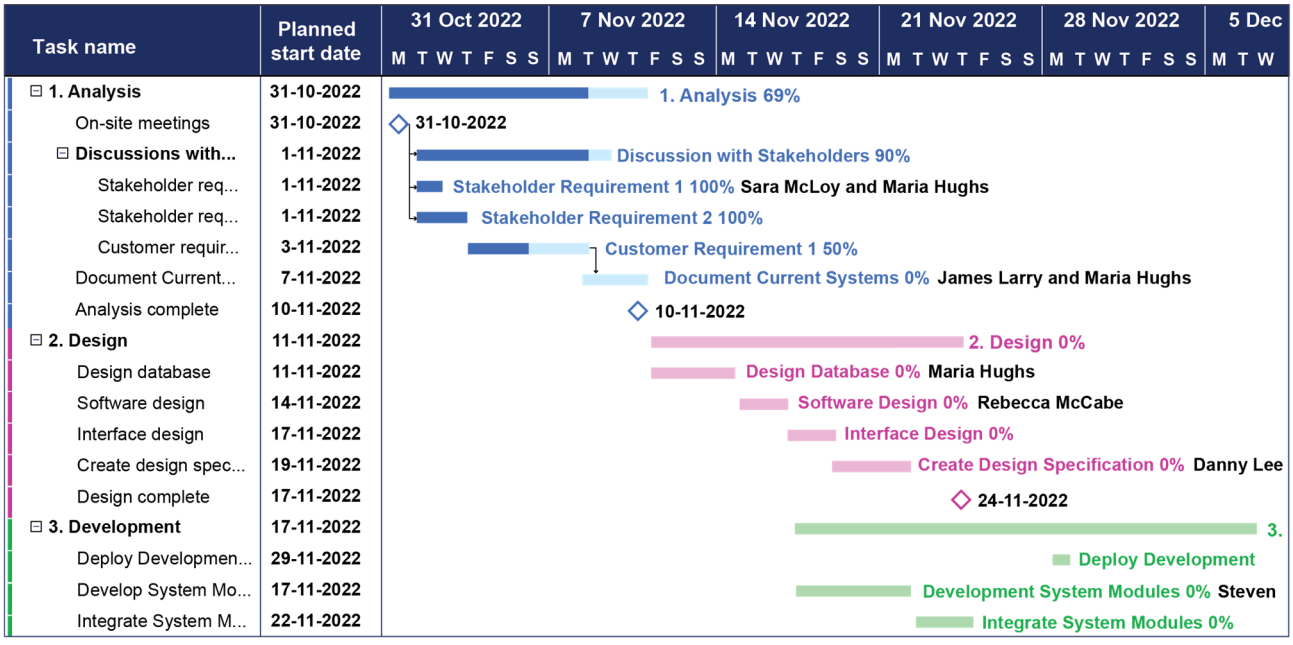
Gantt charts

A Gantt chart displays each of the component tasks in a proposed system development on an estimated timeline. Tasks should be named with self-explanatory titles. The estimated time required for each task and its dependent tasks should be clearly shown. The time scale should be clearly indicated with dates and important milestones in the project clearly marked.

The following diagram shows the main elements of a Gantt chart. Other formats are acceptable.



Gantt charts can also be used to allocate resources, including team members, to specific tasks. The following chart shows the percentage completion of tasks by each team member. Charts should be regularly updated during development to reflect actual versus estimated times for tasks.



Process diaries/log books

Process diaries/log books are used to document the progress of a project.

Entries made by team members at regular intervals should include:

- date
- person making the entry
- progress since the last entry
- tasks achieved
- stumbling blocks or issues encountered and how they were managed
- possible approaches for upcoming tasks
- reflective comments
- resources used.

System Implementation Methods

Students are expected to recognise and understand these system implementation methods:

- direct
- parallel
- pilot
- phased.

Methods for Testing a System

Students are expected to recognise and understand the following methods for testing a system:

- functional testing
- acceptance testing
- live data
- simulated data
- beta testing
- volume testing.

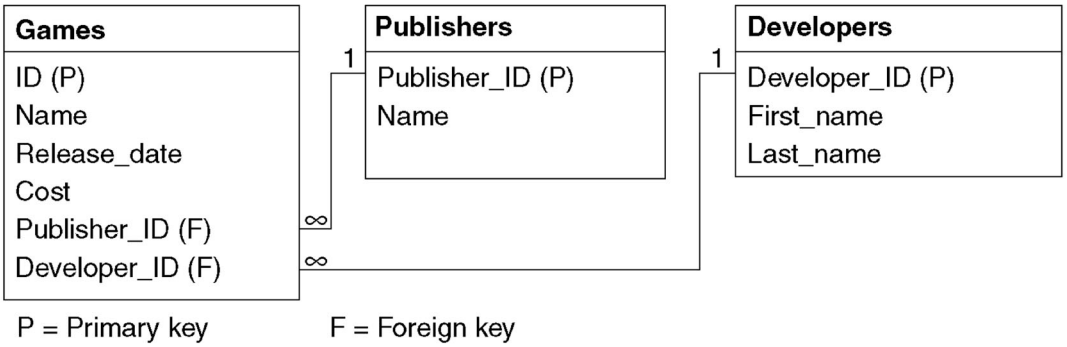
Relational databases

Normalisation

Normalisation is a process used in relational database design where data duplication is minimised by separating the database into a number of smaller linked tables. Each table should include fields that are solely dependent on the primary key in each table. If a database contains redundant data, potentially these data elements may not be updated consistently, leading to a data integrity problem.

Schemas

A schema shows the organisational structure of a database. It shows the entities and their attributes. It should clearly identify the primary key in each table and the links and relationships between tables. The following demonstrates one way a schema can be represented. There are other acceptable methods that students can use.



SQL Syntax

Structured Query Language (SQL) is a language used to access and manipulate data in relational databases. For the HSC Enterprise Computing course, students are expected to know the following standard syntax.

```
SELECT (what is to be displayed)
FROM (the tables to be used)
WHERE (the search criteria which may come from multiple tables)
ORDER BY (the sequence in which the results are displayed)
```

Using the schema set out on page 16 of this document, applying the following query will display the name and release date of all games released from 1 March 2022 to 31 March 2023. The results will be displayed in alphabetical order by game name.

```
SELECT Name, Release_date
FROM Games
WHERE Release_date >= '01/03/2022' AND Release_date <=
'31/03/2023'
ORDER BY Name ASC
```

Applying the following query will display each developer's name, together with the games they have developed for the publisher 'Games Inc', listed in descending order of the developer's last name.

```
SELECT Developers.First_name, Developers.Last_name, Games.Name
FROM Games, Developers, Publishers
WHERE Publishers.Name = 'Games Inc'
          AND Publishers.Publisher_ID = Games.Publisher_ID
          AND Developers.Developer_ID = Games.Developer_ID
ORDER BY Developers.Last_name DESC
```

Machine Learning and Statistical Modelling

Students should know that machine learning and statistical modelling can be used independently or together to analyse datasets and make predictions, but they are not required to understand the underlying logic of either.

Students are expected to be aware of their use in real world scenarios.

Application Software Specifications

Students should be familiar with the use of the following features.

Database software

Database software should allow students to:

- create flat file databases and relational databases
- use relational operators, including:
  - `CONTAINS, DOES NOT CONTAIN`
  - `EQUALS, NOT EQUAL TO`
  - `GREATER THAN, GREATER THAN OR EQUAL TO`
  - `LESS THAN, LESS THAN OR EQUAL TO`
- use logical operators, including:
  - `AND, OR and NOT`
- create queries and use a query language to search on single and multiple fields across one or more tables
- sort data using multiple fields to specify the sequence
- design forms and reports
- implement and display a schema
- import and export data
- apply security to the database.

Spreadsheet software

Spreadsheet software should allow students to:

- enter text, numeric values and formulas
- copy cells using both absolute and relative referencing
- fill down and across
- use built-in and user determined formulas, including:
  - *Arithmetic*: SUM, MAXIMUM, MINIMUM, COUNT, ABSOLUTE VALUE, SQUARE ROOT, INTEGER, PART
  - *Statistical*: MEAN, STANDARD DEVIATION
  - *Logical*: IF (determines a value based on a condition being TRUE or FALSE)
  - *relational operators*: LESS THAN OR EQUAL TO, EQUAL TO, NOT EQUAL TO, GREATER THAN and GREATER THAN OR EQUAL TO
  - *Other*: LOOKUP(s)
- print all or parts of a spreadsheet
- import data from a variety of sources
- export spreadsheet data in a variety of formats
- manipulate rows and columns of a spreadsheet and apply a variety of formats
- record, run and edit macro routines to automate processing
- sort selected areas of the spreadsheet
- configure page layouts and manipulate page breaks
- work with data across multiple sheets
- apply conditional formatting to display information
- use filters and pivot tables to display information
- generate and configure charts in a variety of formats, including:
  - bar charts
  - column charts
  - line charts
  - scatter graphs
  - pie charts
- save a chart to a file format for use in other software.

Expert system software

Expert system software should allow students to:

- develop a set of `IF–THEN` rules
- add, remove and edit rules
- display the rules that the system has used to reach a conclusion in both a text format and as a decision tree.

Graphics software

Graphics software should allow students to:

- create and manipulate bitmapped images
- create and manipulate vector graphics as geometric shapes
- rotate, crop, resize and distort graphic images
- import and export graphic data in a variety of formats
- apply textures, patterns and transparent background
- use templates, colour themes and animations.

Presentation software

Presentation software should allow students to:

- create and manipulate text
- apply editing and formatting features
- insert and display text, images, audio, video and animations
- import and export data
- embed objects such as charts and tables from other applications
- use hyperlinks within and outside the presentation
- use templates and themes.