L2 Computing - Unit 2 - Using Digital Applications to Support Projects

Relevant LINKS

BACK TO COMPUTING UNITS **[1]**

Handbook home page **[2]**

Overview

Computer Science at Gold Level requires the candidate to use appropriate digital tools to create and manage projects that involve programming . As a result of reviewing their work, they will be able to identify and use automated methods or alternative ways of working to improve programming and using computers. They will also be aware of issues relating to intellectual property rights. Unfamiliar aspects will require support and advice from other people.

A work activity will typically be 'straightforward or routine' because:

The task or context will be familiar and involve few variable aspects. The techniques used will be familiar or commonly undertaken.

Example of context – designing, planing, implementing and testing a basic program for controlling a physical system.

Support for the assessment of this award

Example of typical Computing work at this level (Coming Soon)

Assessor's guide to interpreting the criteria

General Information

QCF general description for Level 2 qualifications

- Achievement at QCF level 2 (EQF Level 3) reflects the ability to select and use relevant knowledge, ideas, skills and procedures to complete well defined tasks and address straightforward problems. It includes taking responsibility for completing tasks and procedures and exercising autonomy and judgement subject to overall direction or guidance.
- Use understanding of facts, procedures and ideas to complete well defined tasks and address straightforward problems. Interpret relevant information and ideas. Be aware of the types of information that are relevant to the area of study or work.
- Standards must be confirmed by a trained Level 2 Assessor or higher
- Assessors must at a minimum record assessment judgements as entries in the online mark book on the INGOTs.org certification site.
- Routine evidence of work used for judging assessment outcomes in the candidates' records of their day to day work will be available from their eportfolios and online work. Assessors should ensure that relevant web pages are available to their Account Manager on request by supply of the URL.
- When the candidate provides evidence of matching all the criteria to the specification subject to the guidance below, the assessor can request the award using the link on the certification site. The Account Manager will request a random sample of evidence from candidates' work

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that verifies the assessor's judgement.
- When the Account Manager is satisfied that the evidence is sufficient to safely make an award, the candidate's success will be confirmed and the unit certificate will be printable from the web site.
- This unit should take an average level 2 learner 40 guided hours of work to complete.

Assessment Method
Assessors can score each of the criteria N, L, S or H. N indicates no evidence and it is the default setting. L indicates some capability but some help still required to meet the standard. S indicates that the candidate can match the criterion to its required specification in keeping with the overall level descriptor. H indicates performance that goes beyond the expected in at least some aspects. Candidates are required to achieve at least S on all the criteria to achieve the full unit award.

Once the candidate has satisfied all the criteria by demonstrating practical competence in realistic contexts they achieve the unit certificate. Candidates that meet the requirements for all units achieve 30 marks and are then eligible to take the grading examination. Grades from the exam are A*, A, B, C. No grade can be awarded at level 2 without taking the examination with at least 40% of the marks coming from the examination.

Expansion of the assessment criteria

1. The candidate will be able to select, combine and evaluate applications

1.1 I can compare suitable applications that can support my work

Candidates should be able to make comparisons between similar applications that they have used as a basis for selecting an application for a particular task or project.

Evidence: from assessor observations, documentation in portfolios.

Additional information and guidance

The aim is for candidates to make objective and informed decisions about the tools they use rather than just using those that are popular or have the biggest marketing budget. Build on Level 1 work to become more sophisticated in decision making. In the adult world their is often strong partisan alignment with particular brands that is often only based on experience of that brand. Candidates should consider the wisdom of this and this also relates to open standards and interoperability. It is in company interests to lock users into their technology, it is in user interests to be able to change technologies without too much hassle. Things like non-standard connectors for power supplies and other peripherals is environmentally damaging and serves no other purpose except for the owner to charge a premium for the connector because customers can’t get it from a different supplier. There is an argument for non-standard features when they really are innovative and provide some specific benefit but that is increasingly rare as computer technologies become commodities. Often the benefits are marginal at best.

1.2 I can organise and classify data and/or information

Candidates should be able to organise their data files and the information within them as well as information shared on the web.

Evidence from assessor observations, content of learner portfolios.

Additional information and guidance

The main purpose of this criterion is to encourage candidates to organise their work so they can find things. By implication, candidates should be familiar with common file types and their relationship with particular applications. Strictly speaking data are just unorganised facts, statistics and such-like. Data become information when organised to provide meaning. Some of this could be grouping

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similar items but using meaningful titles is also important. This is because searches and sorts often make it less necessary to group files by type because you can just search for them when needed. This does require some discipline when naming files. As an example, Google drive labels items so they can be organised by search rather than in a conventional filing system.

Assessors should be flexible in awarding this criterion. Ff there is clear method and a systematic approach, even if it isn't always 100% effective this is sufficient. Organisation does not have to be complex and it is often better to keep things simple. Information in web pages should be structured clearly and in logical order. It is more difficult in web pages to position images and so at this level it is sufficient to provide clear logical order. It might be worth linking the classification of information here with work on eg keys in biology. It could also help in understanding classes in object orientated programming.

1.3 I can format data for different applications

Candidates should know that applications expect their data in particular forms and act appropriately when preparing data and information for others.

Evidence: from assessor observation and content of learner portfolios.

Additional information and guidance

This is similar to work on protocols. The way data files are organised internally is critical as to whether an application can access them. Even changing one byte can prevent an entire file from being accessed. Some applications are more tolerant than others. This could be related back to 1.1. As a specific example, MS Word will usually reject a corrupt .doc document that might have only a minor error. Apache OpenOffice can often open such files with only a few corrupted characters. It depends on the programmers as to how they deal with errors. Clearly if you have a 100 page document that has two or three words that are corrupt, it is a lot better to be able to open it and fix the problems than to just get an error message saying "go away the file is corrupt".

There is potential to relate this work to both 1.1 and 1.2 above. There are many different file formats for very similar and overlapping tasks. This has arisen through the natural growth and competition on a new market but now there is an increasing tendency to standardise on open formats because then software can be developed to translate the data between different formats so it is usable in more than just one application. (See 1.4 below)

The important things for candidates is to be able to find and use the "Save as" and "export" options usually under the file menu and try to use open file formats such as .jpg, .png and .svg whenever possible. Try to avoid applications where there is no export to an open standard.

1.4 I can explain interoperability

Candidates should be able to recognise the term interoperability and associate it with being able to use applications from different providers to originate, edit and exchange information.

Evidence: From content of learner portfolios.

Additional information and guidance

Candidates should understand that it is usually in the user's interests to support open data formats because they prevent them being locked into particular applications. All should appreciate that open formats enable interoperability. Not always, but at least it provides the possibility.

Web browsers and W3C standards are a good illustration. To start with HTML, the language to present information in a web page, was made freely available to everyone. Two browsers emerged, Netscape and Internet Explorer. IE was given away with Windows so Netscape was presented with an increasing distribution disadvantage. Microsoft provided tools that made web sites that could not be viewed well in Netscape and so IE became an almost total monopoly with over 90% of the market.

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The result was a stagnated browser development because there was no competitive drive for improvement. FireFox offered a better and Open Source alternative with innovative “tabbed” browsing followed by another open source based browser in Google Chrome. Now there are 3 dominant browsers, Chrome, Firefox and Internet Explorer with other significant players such as Safari and Opera. IE has been improved beyond all recognition recently as many people rejected it even though it was per-installed on their desktop. The dominance of IE is likely to decline further with smartphones that don’t run windows or IE becoming used increasingly for web access. Now all browsers need to keep to the standards or risk being isolated. The latest version of HTML at the time of writing is HTML 5. This promises to further standardise information formats on the web. You can test your browser’s compliance with HTML 5 here [3].

The point of all this is that it is highly desirable to have an internet that is interoperable. We don’t want to have to buy all mobile phones from a single monopoly supplier so why would we want to buy all computers from one source? All software? All peripherals? We can already see the benefits of freeing up web based competition. A lot of the applications on the internet are legal and free or very low cost and we take it for granted that we can choose our smartphone and expect it to work compatibly with any other devices on the web. Interoperability is almost taken for granted on the web whereas on desktop computers even using a computer without Windows has until very recently been seen as a big compatibility risk.

1.5 I can use collaborative technologies safely

Candidates should be able to work as part of a group sharing information, its production and concurrent editing.

Evidence: From assessor observations and learner portfolios

Additional information and guidance

Examples of collaborative technologies include:

1. Google Docs on Google Drive
2. Google Hangouts/Skype/Flash Meeting
3. TLM evidence management system
4. Social networking sites
5. Smartphones
6. E-mail

This list is not exhaustive. Candidates should use one or more collaborative technology to make a positive contribution to their work. They should be encouraged to combine applications to do this and the work can include programming or scripting. This is an opportunity to undertake a small scale project that can be supported by collaborative technologies especially where it would be difficult or impossible to carry out the project. An example might be to manage a project with non-English speakers using translation software and an e-mail list. At level 2 the use should go beyond simple exchange of messages eg by e-mail. Safety issues should be considered and a risk assessment would be a reasonable way of doing this before any collaborative projects commence.

2. The candidate will be able to create original works using digital applications

2.1 I can originate digital information from my own imagination

Candidates should be able to originate digital resources from a zero base.

Evidence: Assessor observations, local testing, portfolios.

Additional information and guidance

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Candidates should create something original from a zero base. Building on Level 1, Level 2 candidates should be more self-sufficient and produce resources with several dimensions e.g. by having two distinct design elements e.g. sourcing an image with a camera, editing it in and image editing program and combining it with vector objects in a drawing program. Another similar activity might be to make a video by recording their computer desktop and adding captions or a commentary recorded separately. The spirit of this criterion is creativity and while use of existing work is not banned where it is sensible to incorporate it, there should be a clear element of original work rather than exclusive remix of other people's work. Remix is a legitimate creative activity in its own right and it is assessed in the next criterion so the emphasis here should be on originating new material.

2.2 I can use remix to create original digital information

Candidates should be able to edit and combine existing information to create something new with an element of originality.

Evidence From portfolios

Additional information and guidance

At level 2 candidates should be able to ensure that their work is legal from an intellectual property point of view and acknowledge their sources. They should be able to choose sources so that the remixed outcome looks reasonably coherent as a new item rather than obviously just unconnected items pushed together. There are many good examples of remix on the web. While remix is normally associated with music and video, it doesn't have to be and it is up to the assessor and candidate to decide on the exact nature of the evidence. There is some useful video information here [4].

2.3 I can consider digital technology issues to inform my design techniques

Candidates should be able to relate technical knowledge to specific design techniques in their work

Evidence: From assessor observations and portfolios

Additional information and guidance

For level 2, candidates should build on the Level 1 requirements in keeping with the overall level statement. They should be increasingly aware of fundamental digital principles when designing information artifacts or systems for other people to use. File size, interoperability, legal issues.

2.4 I can match my work to a target audience

Candidates work should include features that are obviously appropriate to the target audience.

Evidence: Assessor observations and portfolios.

Additional information and guidance

Two clear possible audiences are their family and younger less experienced learners. If projects are originated to support learning in younger pupils, there should be obvious characteristics in the context of what they present that will appeal to the younger audience. Adults, even teachers are not that good at removing themselves from what appeals to them as opposed to what appeals to a very young child. This was demonstrated in Sesame Street for example, by repetition e.g. with the Count, that the original program designers did not plan because of the advice of educational psychologists. The repetition emerged from empirical evidence observing what did and did not engage the children. The best evidence will always come from "customer feedback".

2.5 I can compare my work to acknowledged good practice

Candidates work should find examples of similar work to their own that is considered good and make

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comparisons

Evidence: Assessor observations and portfolios.

Additional information and guidance

Finding professional standard work in just about any field is straightforward using the internet. Candidates should take at least one of their extended pieces of work, find something similar and make objective comparisons. For example they might make a short digital video to explain how to do something and search You Tube for similar videos. They might have produced a program for a web based game and compare it with a similar game. They might design a logo and compare with some company brand logos.

3. The candidate will be able to manage projects

3.1 I can devise a project plan to explain my intentions

The candidate should be able to put together a simple structured plan to explain what they intend to achieve and how.

Evidence: Portfolios

Additional information and guidance

Candidates can build on level 1 supported planning to move onto self-sufficiency. Plans do not need to be elaborate. They should be plausible summaries of what the candidate intends to do and why this will secure the outcome. In general plans should explain the aim or aims of the project, a time schedule with milestone goals, any other resources needed and a clear set of SMART steps along the way.

3.2 I can set deadlines on the way to reaching my project goal

The candidate should set deadlines and justify their inclusion in their project planning.

Evidence: From portfolios.

Additional information and guidance

Candidates should be encouraged to consider the targets and deadlines they set in the light of how likely they are to be achieved. They should realise that setting a target and a deadline mean they are committed to them and need to do what it takes to be reasonably sure of achieving them.

3.3 I can meet deadlines on the way to reaching my project goal

The candidate should be able to demonstrate that they have met deadlines by providing appropriate evidence.

Evidence: From portfolios

Additional information and guidance

Candidates should understand that if they have set themselves a challenge it might turn out to be more difficult than they anticipated. In such cases they should not give up, they should look for ways of getting back on schedule by either revising the original goal, modifying their actions or putting more time in. This is partly about courage and capacity to take responsibility in keeping with the general level 2 descriptor.

3.4 I can apply e-safety principles to my projects

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The candidate should be aware of e-safety issues and be prepared to take action in keeping with the general description of level 2 qualifications.

Evidence: From assessor observations and portfolio

Additional information and guidance

Being safe online is the objective. At level 2 candidates should be building on the structured support necessary in some areas for level 1 to build greater self sufficiency in keeping with the level 2 descriptor. Part of this criterion is still the appreciation and willingness to take advice from more experienced people but the aim should be to become at least basically safe [5] without the need for supervision.

3.5 I can show courage in completing a project

The candidate should demonstrate courage in persevering and making an effort to overcome difficulties

Evidence: From assessor observations and documentation in portfolios

Additional information and guidance

The spirit of this criterion is to recognise the fact that at level 2 candidates are expected to make an effort to overcome difficulties themselves. In some cases they will still need help but real life projects require courage to complete and this is an opportunity for candidates to demonstrate this quality.

3.6 I can evaluate a project in terms of its strengths and weaknesses

The candidate should provide at least one reasonably detailed evaluation of a project.

Evidence: From portfolios of evidence.

Additional information and guidance

The evaluation should focus on strengths and weaknesses and provide a commentary on what went well, what went wrong and what could be improved. This could be in writing but video and audio are perfectly legitimate media as long as the main characteristics of an evaluation are reported.

4. The candidate will respect intellectual property

4.1 I can describe my preferred license for my project

The candidate should be able to describe the licensing they prefer for at least one project that has copyrightable outcomes.

Evidence: From assessor observations, portfolios

Additional information and guidance

The implication is that candidates will have considered more than one license for their work and that they can state the reasons for the particular license they choose.

4.2 I can compare liberal and restrictive licenses

Candidates should be able to make an objective comparison of at least one liberal and one restrictive license.

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Evidence: From assessor observations and portfolios

Additional information and guidance

See also the level 1 guidance. For this criterion, some more in-depth consideration is required. Licensing is a very complex field and the main aim is to get candidates to understand this together with the importance of licensing in the world of work. While at home people often get away with copyright infringements it is a wholly different situation at work (and in school) because of corporate responsibilities and interdependence of people and their businesses. In the end, any work they originate is their own copyright unless they signed some sort of agreement with e.g. an employer assigning their copyright to them. Some companies will only employ people if they effectively sign over their " intellectual property rights [6]" while in that employment. Candidates might like to consider the fairness of someone originating and idea at home outside working hours and then having it owned by the company.

4.3 I can describe the 4 freedoms of Free and Open Source Software

The candidate should be able to describe the basic gist of the 4 freedoms conveyed by free and open source software and understand the general implications.

Evidence: Assessor judgements and portfolios.

Additional information and guidance

The 4 freedoms were first proposed by Richard Stallman a computer scientist from MIT who founded the GNU organisation to try and prevent corporate and commercial interests from being too dominant. The 4 freedoms are:

1. The freedom to run the program, for any purpose (freedom 0).
2. The freedom to study how the program works, and change it so it does your computing as you wish (freedom 1). Access to the source code is a precondition for this.
3. The freedom to redistribute copies so you can help your neighbour (freedom 2).
4. The freedom to distribute copies of your modified versions to others (freedom 3). By doing this you can give the whole community a chance to benefit from your changes. Access to the source code is a precondition for this.

Later some people though the term Free software was confusing because people interpreted it in the same sense as "freeware" ie software that is free of charge and the term Open Source [7] was proposed as a replacement. Now we hear FOSS (Free and Open Source Software) FLOSS (Free Libre, Open Source Software) as well as just plain Open Source. "Commercial Open Source" has also been invented as it became obvious that the Open Source label was useful branding. If we use the OSI definition of Open Source software, most Commercial Open Source Software is not Open Source as it is often only a subset of the characteristics in the definition.

At this level it is easier for candidates to remember the 4 freedoms in what is a complicated field and these provide a good idea of what it is all about. The main criticism of Free and Open Source software is that there is no business model to fund development. This is obviously not the case since there are many large open source software projects that are thriving. Selling services around an open source "ecosystem" seems to be the most sustainable. If you like coding, contributing to an Open Source project can convey social status and satisfaction that transcends financial rewards. The internet has made a huge difference because people from all over the world can share collaborative interests and it takes relatively few from the 7 billion to provide the necessary resources. In addition, the whole point of FOSS is to share code so libraries are getting steadily larger and large projects then take relatively little human resource to build and maintain. On the proprietary megalithic model an individual company has to build everything and compete with lots of other also replicating similar effort. The FOSS model is cooperative and shares the resources building on existing resources and is

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likely to be long term much more efficient as all the previously developed real estate is there to build on. Re-mix is a similar concept and it is no coincidence that big changes are taking place in both the software and content industries.

4.4 I can explain the difference between copyright and license

Candidates should know the nature of what is appropriate to have a copyright assigned to it and how licensing then comes into play.

Evidence: From assessor observation and portfolios

Additional information and guidance

Whenever you create a work such as a book, software, music or video you own the copyright which means you have the right to say who can and can not use the work and in what way. The means of doing this to provide a license. Although there are many ready made licenses the copyright owner can use, they can also make up their own if they want to. A lot of people say copyright free when they mean a copyright work that is licensed for free use. Work in the public domain has no copyright assigned to it. This is the most convenient situation for end users because they can do anything they like with the work without having to make acknowledgements.

4.5 I can explain the terms Creative Commons and DRM

Candidates should be able to explain Creative Commons as a class of licenses and DRM as a way of preventing illegal copying against the terms of a license.

Evidence: From assessor observation and portfolios

Additional information and guidance

Creative Commons [8] is a whole set of licenses that provide different conditions for use of a work. Licenses are designed to enable sharing but with some restrictions such as no commercial. The idea is to enable creative people to share their work on terms they feel is best for them. The term Copyleft is used for licenses that encourage sharing of resources by specifying that work derived from copyleft licensed works has to be licensed with the same terms. This is another example of recursion. It is usual to use Creative Commons licenses for works other than computer software. Licenses such as the GPL GNU Public license are more used for software.

DRM is digital rights management is a class of technologies used with the intent to control the use of digital content, after licenses to use the content have been sold. It is controversial because some people say that the inconvenience to users outweighs the need for the owners of the content to protect it. The reasons it is inconvenient to users is that it prevents them from making backups or using the work on a different device. It also means that the formats used for the content are not generally the normal open ones. In principle all mobile devices could use HTML to display information. We can convert HTML screens to pdf or print them directly should they need to go on paper. Then any ebook could simply be displayed in any web browser on any device. The snag with HTML is that it is an open format that would make DRM difficult if not impossible to implement. DRM goes beyond books and can be used to control video, audio and pretty well any media.

Some people say DRM won't work in any case because it will "get hacked" and once someone knows how to do it that will quickly spread. DRM adds to the complexity of the technology and therefore increases costs. In some cases DRM is probably counter-productive because it puts a barrier to entry in the way of take up. It's arguable that You Tube and Wikipedia would not have taken off if it had DRM forcing users to pay to watch the videos. On the other hand, services like You Tube need revenue to pay for their operation. Advertising is the alternative to charging subscriptions. We are in the middle of a very turbulent shift from a time when just about all content was controlled by large corporate publishing organisations to much greater scope for individuals to do it themselves. An individual might think getting their work seen more important than trying to make a lot of money from it. Digital technologies enable individuals to be much more self-sufficient and less dependent

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on large and expensive bureaucratic structures so perhaps the demise of those structures is inevitable or perhaps they will just have to reform. No-one really knows.

Moderation/verification
The assessor should keep a record of assessment judgements made for each candidate and make notes of any significant issues for any candidate. They must be prepared to enter into dialogue with their Account Manager and provide their assessment records to the Account Manager through the online mark book. They should be prepared to provide evidence as a basis for their judgements through reference to candidate e-portfolios and through signed witness statements associated with the criteria matching marks in the on-line mark book. Before authorizing certification, the Account Manager must be satisfied that the assessors judgements are sound.

Source URL: https://theingots.org/community/cpl2u2x

Links
[1] http://theingots.org/community/Computing_qualification_info_units
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