CET 101 Fundamentals of Computing 2019-20 Assessment 5

## Professional practice week: 16th of March

In this assessment, we are assessing the skills you have developed so far in the following areas:

* Understanding of standards, formats and tools used in the design of information, multimedia and web-based systems
* Recognition of the need for adaptable approaches to problem solving
* Ability to specify and contextualise a problem and communicate effectively an appropriate solution to a range of audiences
* Use of software engineering techniques to design, code, test and evaluate a range of software solutions
* Appraisal of the fundamental operation of computer systems, network architectures, hardware components, operating systems and associated protocols and data structures

**All of this work is to be completed individually.**

**This assessment is taking place as a Full Professional Practice Week.**

**Your problem will be issued at 9am Monday and you will submit by 9am Friday. This means you have 4 working days to complete it. We assume that 4 working days means 7 hours per day (as if you are working a full time job, 9am-5pm with lunch break), and your tutor and moderator have agreed that the task should take no longer than 28 hours.**

## Justification

Cycling has seen a massive increase in popularity across the world in recent years, especially in the UK. Not only does it have health benefits but it also is currently having a positive effect on the economy, with more and more people spending their money on the latest bikes, accessories and clothing. Cycle holidays are more popular than ever and have overtaken golfing as the activity holiday of choice for the UK. With the rise of cycling sees the rise in cycling related fitness equipment and technology. Smart turbo trainers now let you compete virtually against people online from the comfort of your own home, smart exercise bikes rank and score you against other competitors and apps track your cycle routes and count your miles for online leaderboards.

## Background

Cities across the UK have decided to host a national cycling competition where individuals or cycling groups can compete against each other to be crowned an overall winner or winners.

The event will be called Cit-E Cycling.

The format of the event will be that ten mini pop up tournaments are to be held across the city in different locations and each event will last for 3 days. There will be 20 high tech exercise bikes that will be able to track how many miles you have cycled and your power output. This data will then be used to rank the different participants against each other. Participants must book an hour time slot in advance so that they can come to the event and compete. Each participant is only allowed to enter the competition once and they have the option of entering as part of a cycling group or as an individual. Prizes will be awarded for the different age categories, different genders and for the best performing cycle group.

Winning participants will then be invited to compete for their city in a national event that pitches the cyclists from each city against each other.

## Problem

The organisers realise that this event is going to require expertise in a lot of different areas such as software engineering, website development, networking, programming and systems design if the event is to be successful. It will be your responsibility to ensure that each problem has been tackled effectively and that a solution that meets the needs of the client has been provided.

Bear in mind the ethical issues that may present themselves and be sure to conduct yourself professionally. Be aware that you are required to work under the university’s IT acceptable use policy which you can access [here](https://my.sunderland.ac.uk/display/SH/IT+Acceptable+Use+Policy). Note in particular under internet unacceptable use:

* 3.4 Use, transmission, duplication, or voluntary receipt of material that infringes on the copyrights, trademarks, trade secrets, or patent rights of any person or organisation. All users must assume that all materials on the Internet are copyright and/or patented unless specific notices state otherwise.
* 3.6. Creation, posting, transmission, or voluntary receipt of any unlawful, offensive, libellous, threatening, harassing material, including but not limited to comments based on race, national origin, sex, sexual orientation, age, disability, religion, or political beliefs.

## Your Tasks

### Task 1: Networking (50 marks)

The event organisers require a prototype network that will help them test the performance of the new software. The prototype must be built using the Packet Tracer network simulator. You have been provided with a cabled simulation containing two sites. You are required to configure the networking devices within the simulation. If you complete all the tasks outlined below then the two PCs within the network simulation should be able to access the web page of the server. You are not permitted to alter the cabling or add or remove networking devices from the simulation.

[**Please download this packet tracer file to start the task**](https://drive.google.com/open?id=1b6y0VT1j0dbbX0qUF7YnCcjkaGEmbVIg)

[**For working with self marking packet tracer files please read this**](https://drive.google.com/open?id=1YH3Va_s_qWSH3EOnS6xy4qPU2DfD6bJg)

**Initial Router and Switch Configuration**

* Assign each router and switch its name. The name of each device is found on the simulation diagram. Leave the switches with their default VLAN configuration.
* Assign the router ports their IP addresses and subnet masks as shown in the table below. Make sure that you activate all router interfaces that are assigned IP addresses.

|  |  |  |  |
| --- | --- | --- | --- |
| ***Router*** | ***Router Port*** | ***IP Address*** | ***Subnet Mask*** |
| R1 | Gi0/0 | 10.0.1.1 | 255.255.255.0 |
| R1 | Gi0/1 | 10.0.2.1 | 255.255.255.0 |
| R1 | Gi0/2 | 10.0.7.1 | 255.255.255.0 |
| R2 | Gi0/0 | 10.0.3.1 | 255.255.255.0 |
| R2 | Gi0/1 | 10.0.4.2 | 255.255.255.0 |
| R2 | Gi0/2 | 10.0.1.2 | 255.255.255.0 |
| R3 | Gi0/0 | 10.0.4.1 | 255.255.255.0 |
| R3 | Gi0/1 | 10.0.5.2 | 255.255.255.0 |
| R3 | Gi0/2 | 10.0.2.2 | 255.255.255.0 |
| R4 | Gi0/0 | 10.0.5.1 | 255.255.255.0 |
| R4 | Gi0/1 | 10.0.3.2 | 255.255.255.0 |
| R4 | Gi0/2 | 10.0.6.2 | 255.255.255.0 |
| R5 | Gi0/0 | 10.0.6.1 | 255.255.255.0 |
| R5 | Gi0/1 | 10.0.8.1 | 255.255.255.0 |
| R5 | Gi0/2 | 10.0.9.1 | 255.255.255.0 |

**Dynamic Routing**

* Routers **R1, R2, R3** and **R4** are all part of one large site. Deploy RIP version 2 on each of these routers.
* Make sure that each router interface, that has been assigned an IP address from the Class A network **10.0.0.0,** participates in the RIP routing process.
* You should also disable automatic route summarisation within RIP on all four RIP routers.

Note: **R5** must *not* run RIP as it is part of a separate site.

**Static Routing**

* Add a static default route to **R5** that will make **R5** forward packets destined for unknown networks to **R4**.
* Add a static route to **R4** that will make **R4** forward packets destined for the **10.0.8.0/24** network to **R5**
* Add a static route to **R4** that will make **R4** forward packets destined for the **10.0.9.0/24** network to **R5**
* Make sure that **R4** includes its two static routes within its RIP routing updates.

**DHCP**

Configure **R5** as a DHCP server. **R5** must automatically assign any local PC attached to switches **S2** and **S3** their IP address, subnet mask and default gateway. Create two DHCP Pools on **R5** using the information contained within the table below

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pool Name** | **Network** | **Subnet Mask** | **Default Gateway** | **Excluded addresses** |
| HR | 10.0.9.0 | 255.255.255.0 | Work it out | 10.0.9.1 – 10.0.9.5 |
| PRODUCTION | 10.0.8.0 | 255.255.255.0 | Work it out | 10.0.8.1 – 10.0.8.5  10.0.8.40 – 10.0.8.50 |

**PCs and Server**

* Configure the two PCs so that they automatically request their IP address, subnet mask and default gateway from the DHCP server.
* Give the server the IP address **10.0.7.2** and the subnet mask **255.255.255.0**. Its gateway should already be set to **10.0.7.1** Make sure that its name is **Web Server**

#### Submission Information

You must submit a screenshot of your packet tracer simulation that identifies the grade you achieved in this activity. Please submit this as a word or pdf document.

You must also submit your completed packet tracer file. It should have the following name

**CET101 PPW5 Task 1 Your Name.pka**

All tasks are to be submitted to Canvas by 9am on Friday 20th of March

This excludes anyone who has additional time due to having a support memo in place.

Task 2: Presentation (20 marks)

Now that the Cit-E cycling event is drawing to a close, you are looking for your next contract. Often, in industry, you are required to pitch for contracts and compete against other companies to secure future work. An opportunity to pitch for a contract has presented itself and you have decided it’s within your scope.

Prepare a ten minute presentation where you will outline how you plan to win this contract.

In this presentation, you will need to demonstrate an understanding of core concepts and propose solutions to the problems outlined in the brief below:

*“Thumb-busters” are a local company who have six different highstreet shops across the region. They specialise in retro computer gaming, but are looking to expand and branch out into different areas of computer gaming related activities.*

*The first problem they have is that they would like their website updating. It hasn’t been updated since 2005 and a lot of information is out of date and it doesn’t work on mobile devices. They would like a brand new website where customers can search their second hand stock for product prices and also search for “trade-in” prices. They are not yet interested in selling products online.*

*The company would also like to start hosting LAN parties and tournaments in their stores. They currently have no hardware to do this but are looking to put 30 gaming PCs into each store and network them together. They also want each store to be able to compete against each other on a larger network for larger tournaments.*

*They also need a system where stock can be catalogued and itemised as it comes into each store. This system would also need to double up as a till for the sale of their products.*

Your presentation should cover how you would solve the problems outlined above. You are not required to program any working solutions.

#### Marking Criteria

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Criteria | High marks | Mid marks | Low marks | No marks |
| Presentation slides | 11-15  A very good professional presentation that covers all of the points and proposes correct, technical and valid solutions that would work for the company. | 6-10  A presentation that is good but has room for improvement. Some solutions will be accurate and valid but others might need more work. | 1-5  A poor presentation that lacks professionalism and is in need of vast improvement. Solutions proposed will not likely work for the company. | 0  Not attempted |
| Screencast | 4-5  A professional screencast with good narration and timings are adhered to. | 2-3  Screencast might be lacking professionalism and the timings may not be | 1  Screencast is very poor and is not professional. Timing has not been considered. | 0  Not attempted |

#### Submission Information

Please submit a ten minute screencast in mp4 format as well as your presentation slides by 9 am Friday 20th of March.

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### Task 3: Software Engineering (30 marks)

When developing software, testing and evaluation are important parts of the Software Development Life Cycle (SDLC).

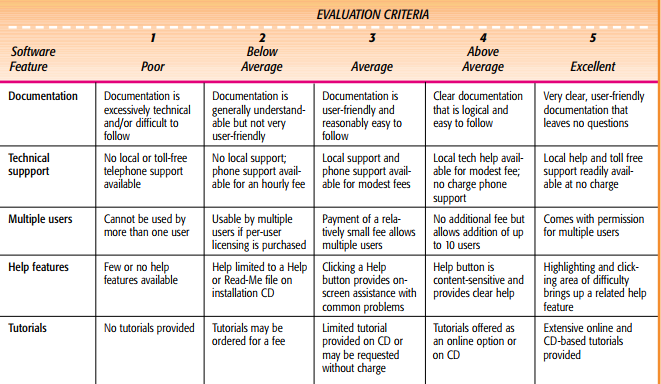
**Part 1 (20 Marks)**

Write and execute a comprehensive structural test plan for ***either*** the data driven website ***or*** the forms application that you completed for **PPW4**. Consider the key messages that we covered in class:

1. Testing should link with earlier stages of SDLC e.g. requirements specification (PACT, Flow Chart, etc)
2. it should use formal and clear plans (use the 3 stage process: test run chart, test type, test case table)
3. it should be effective rather than exhaustive

**Part 2 (10 Marks)**

Develop evaluation metrics for, and then perform a user based evaluation of your chosen test application using the following example format:



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#### **Marking Criteria**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Structural Test Plan:** | **20 - 15** | **14 - 9** | **8 - 1** | **0** |
| **Comprehensive Plan**  Your plan is complete and you have used effective rather than exhaustive methods to test your program. You show links to previous steps in the software development life cycle. Your paperwork is presented professionally and is error free. | **A Good Test Plan**  Your plan is almost complete and you have tried to use effective rather than exhaustive methods to test your program. You show some links to previous steps in the software development life cycle. Your paperwork is presented well with only minor errors. | **Adequate Test Plan**  Your plan is basic and shows some understanding of the methods needed to test your program. You have tried to show links to previous steps in the software development life cycle. Your paperwork is presented to a basic standard and may have some errors. | **No test plan**  You have not submitted this part of the assessment. |
| **Evaluation Metrics:** | **10 - 7** | **6 - 4** | **4 - 0** | **0** |
| **Comprehensive Evaluation**  You have developed strong metrics to evaluate your program, which has allowed you to show that the program meets its aims and objectives for both the user and the client. Your work shows a clear understanding of the requirements of software evaluation. Your work is presented well with no errors. | **Good Evaluation**  You have developed good metrics to evaluate your program, which has allowed you to show that the program meets some of its aims and objectives for both the user and the client. Your work shows some understanding of the requirements of software evaluation. Your work is presented well with few errors. | **Basic Evaluation**  You have developed basic metrics to evaluate your program, which shows that the program meets some of its aims and objectives. Your work shows a basic understanding of the requirements of software evaluation. Your work may have some errors. | **No Evaluation Metrics**  You have not submitted this part of the assessment. |

**Submission Information**

Please submit a single PDF/Word document containing your work to the assignments section on canvas by 9am Friday 20th of March

### Submission information

All tasks are to be submitted to Canvas by 9am on Friday 20th of March

This excludes anyone who has additional time due to having a support memo in place.

Please see the individual tasks for specific submission requirements such as naming conventions, file formats etc.