CET 101 Fundamentals of Computing 2019-20 Assessment 4

## Professional practice week: 17th of February

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: Programming (35%)

Effective management of Cit-E-Cycling involves multiple activities in addition to event registration. Event managers have been in discussions with local authorities and have recognised the need for recording health and safety issues, for example incidents and accidents. You have been tasked with developing a small Forms based system which demonstrates how this may be achieved. Your program must have the following functionality:

* Record an incident

The data which must be recorded for each incident is described in Table 1.

|  |  |  |
| --- | --- | --- |
| **Data Field** | **Description** | **Example Value** |
| ID | Incident ID - must be unique | 1001 |
| Name | Participant Name | “Joe Bloggs” |
| Incident Type | Incidents are recorded under 3 categories: Participant, Staff, and General Public. | “Participant” |
| Description | A description of the incident | Tripped and fell |
| Location | Where the incident occurred | “Stadium of Light” |
| Treatment | Whether or not any treatment was administered  *If treatment is yes, a description should be recorded (e.g. wound clean and bandage)* | Yes  No |
| Follow Up | Whether there is any follow up required | Yes  No |

* View all incidents, and the total number of incidents
* View incidents requiring follow up, and the total number of required follow ups.
* View Stats:
  + Total Incidents
  + Total Incidents requiring follow up
  + Percentage of Public incidents
* Persist: A list of all incidents should be saved on application close, and should load when the application first opens.

In addition to core functionality, additional marks will be awarded for the complexity of your Form. Higher marks will be achieved for those submissions demonstrating (but not limited to): Multi Form Functionality, Menu Controls, and Right-Click / Shortcut options.

Marking Criteria

|  |  |  |  |
| --- | --- | --- | --- |
|  | **15.0 to >10.0 Pts** | **10.0 to >5.0 Pts** | **5.0 to >0 Pts** |
| System Functionality & Validation | **High marks** | **Mid Marks** | **Low Marks** |
|  | A very good or excellent attempt at all system functionality with excellent input validation and data persistence. | An average or good attempt at system functionality with some input validation and data persistence | A poor attempt at fulfilling system requirements with much missing or incorrect and no input validation or data persistence. |
|  |  |  |  |
|  | **15.0 to >10.0 Pts** | **10.0 to >5.0 Pts** | **5.0 to >0 Pts** |
| Form Design & Development | **High marks** | **Mid Marks** | **Low Marks** |
|  | A very good or excellent Form,which allows the user to interact with the system in multiple ways. | An average or good Form, which allows reasonable user interaction. | A poor Form Design, incorporating only basic visual components. |
|  |  |  |  |
| Use of House Style | **5.0 to >4.0 Pts** | **4.0 to >2.0 Pts** | **2.0 to >0 Pts** |
|  | **High marks** | **Mid Marks** | **Low Marks** |
|  | Excellent use of naming conventions and commenting | Average use of naming conventions and commenting | Limited or no use of naming conventions and commenting |

#### Submission Information

Please create a windows forms based application and submit your entire solution file as a zip to the “Assignments section” in Canvas by 9am on Friday 21st of February.

Task 2: Data modelling (30%)

You have been asked to develop a form application that will record details of health and safety issues (e.g. incidents and accidents). Initially your system will record these details in a text file, which is not ideal. We will eventually want to run reports based on this data and it should really be kept more securely. In order to do that effectively, we want to plan a relational database for this information.

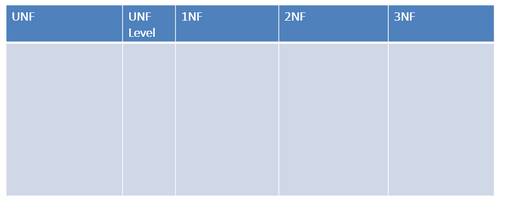
Normalisation is an important part of database design, it reduces the duplication of data in a table(relation) but it keeps the referential integrity - the information is the same but is optimised. In order to maintain information integrity, use the table below to complete the three elements of relational database planning.

|  |  |  |
| --- | --- | --- |
| **Data Field** | **Description** | **Example Value** |
| ID | Incident ID - must be unique | 1001 |
| Name | Participant Name | “Joe Bloggs” |
| Incident Type | Incidents are recorded under 3 categories: Participant, Staff, and General Public. | “Participant” |
| Description | A description of the incident | Tripped and fell |
| Location | Where the incident occurred | “Stadium of Light” |
| Treatment | Whether or not any treatment was administered  *If treatment is yes, a description should be recorded (e.g. wound clean and bandage)* | Yes  No |
| Follow Up | Whether there is any follow up required | Yes  No |

**Part 1:** Draw an Entity Relationship Model **(7 Marks)**

1. Identify the main entities from the table and create a relational model
2. Identify 3 sensible attributes to each entity (some of these can be identified from the table)

**Part 2**: Normalize the data to 3NF using the format bellow **(16 Marks)**



**Part 3**: Draw a 3NF data structure diagram **(7 Marks)**

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#### Marking Criteria

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **7-6 Marks** | **5-4 Marks** | **3-1 Marks** | **0 marks** |  |
| **Draw an Entity Relationship Model** | You have produced a fully accurate ERM that presents the accurate relationships between the entities and their attributes in the data. | Your ERM may have some inaccuracies in the relationships or content of the data presented, but you do show an understanding of the logic. | Your ERM is largely inaccurate in the presented relationships or content and your logic is significantly flawed. | You have not submitted this part of the assessment. |  |
|  | **16–13 Marks** | **12-9 Marks** | **9-5 Marks** | **4-1 Marks** | **0 marks** |
| **Normalisation to 3NF** | You have presented the data correctly and followed the steps needed to process the raw data into the 3rd Normal Form. | You clearly show an understanding of the process of normalisation, but may have taken a miss step and your data is not fully normalised to the 3rd Normal Form | You clearly show an understanding of the process of normalisation, but have taken a serious misstep and your data is not normalised to the 3rd Normal Form | You show little understanding of this process and have not followed it correctly, so your data is not normalised. | You have not submitted this part of the assessment |
|  | **7-6 Marks** | **5-4 Marks** | **4-1 Marks** | **0 marks** |  |
| **Draw a 3NF Data Structure Diagram** | You have produced a fully accurate Data Structure Diagram that fully captures your data and relationships | Your Data Structure Diagram may have some inaccuracies in the relationships or content of the data presented, but you do show an understanding of the logic. | Your Data Structure Diagram is largely inaccurate in the presented relationships or content and your logic is significantly flawed. | You have not submitted this part of the assessment. |  |

#### Submission Information

Please create a pdf report and submit it to the “Assignments section” in Canvas by 9am on Friday 21st of February.

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### Task 3: Website development (35%)

The event organisers are having trouble keeping their development staff and, this time, the lead web developer has resigned from their job as someone ate their packed lunch.

They were in the middle of building a web portal for Cit-E cycling to allow functionality for users to:

* Register for future events
* Search for current participants and teams
* Update the power outputs and distance travelled of participants
* Delete current participants

Some of the work has been done for you. They have left you with a zip file containing all of the web files you will need and the SQL file for the database. The web files are not complete and it will be your job to finish the project.

**You are not required to modify the filenames of these pages, or to change the way they link together. You are also not required to modify the database structure in any way. Doing so will jeopardise your assessment submission.**

Project files can be found here: [cycling.zip](https://drive.google.com/open?id=1e1g9em_03CgavWESjh1fxxt3QCPgPdMW)

#### Project requirements:

Register interest (5 marks)

Complete the register interest functionality so that users can sign up to register their interest for future events. This information should be saved in the **interest** database table.

Edit participant scores (10 marks)

Allow users to update the power output and distance travelled for each participant. These are the only two fields that the user should be able to update for each participant. Participant data can be found in the **participant** table.

Delete participants (5 marks)

Allow users to delete participants. Necessary validation should be included to limit accidental deletion and human error. Participant data can be found in the **participant** table.

Participant and club search (10 marks)

Users should be able to search for individual participants by either their first name or surname. This should then show the user all the information about that participant. Participant data can be found in the **participant** table.

Users should also be able to search for clubs by the club name. They should be able to see all of the players associated with that club. This page should also calculate and display the total distance travelled and power output for each club as well as the average distance travelled and power output for each club. Club data can be found in the **club** table.

Validation (5 marks)

The event organisers want to ensure that this system is as robust as possible so they would like you to implement as much validation as you can.

#### Marking Criteria

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Task | High Marks | Mid Marks | Low Marks | No Marks |
| Register Interest | 5 - 4  An excellent or very good attempt. Fully working functionality and code will be efficient and correct. | 3 - 2  A good to average attempt. Code will be working but improvements can be made. | 1  A poor attempt where code may not be working or incomplete. | 0  No attempt |
| Edit participant | 7 - 10  An excellent or very good attempt. Fully working functionality and code will be efficient and correct. | 4 - 6  A good to average attempt. Code will be working but improvements can be made. | 1 - 3  A poor attempt where code may not be working or incomplete. | 0  No attempt |
| Delete participant | 5 - 4  An excellent or very good attempt. Fully working functionality and code will be efficient and correct. | 3 - 2  A good to average attempt. Code will be working but improvements can be made. | 1  A poor attempt where code may not be working or incomplete. | 0  No attempt |
| Search | 7 - 10  An excellent or very good attempt. Fully working functionality and code will be efficient and correct. | 4 - 6  A good to average attempt. Code will be working but improvements can be made. | 1 - 3  A poor attempt where code may not be working or incomplete. | 0  No attempt |
| Validation | 5 - 4  An excellent or very good attempt. Fully working functionality and code will be efficient and correct. | 3 - 2  A good to average attempt. Code will be working but improvements can be made. | 1  A poor attempt where code may not be working or incomplete. | 0  No attempt |

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Submission Information

Please complete the website files and put them in a folder that is your first name followed by your surname with an underscore to seperate.

Please then zip your attempt and submit this to the “Assignments section” in Canvas by 9am on Friday 21st of February.

If your name was John Smith your submission would look like this: **john\_smith.zip**

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### Submission information

All tasks are to be submitted to Canvas by 9am on Friday the 21st of February.

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.