

# MSc in High Performance Computing

## MSc in High Performance Computing with Data Science

### Software Development Coursework

Session 2018/19

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## Summary

Software Development encompasses more than just coding, it involves, to name a few elements, gathering requirements, design, analysis, planning, identifying risks and communication. The assessment for Software Development is in the form of a small software product development project. This project encompasses **planning, requirements, design and prototyping**. When undertaking this project, you should follow good development practices. You will be expected to justify and explain the decisions you make as part of the assessment. The goal is to create a design and, from this, a prototype. It is important to realise that the aim is **not to create a fully functional complete product, but to create a prototype** which can be assessed for future development.

The product concept description is in the appendix of this assessment.

## Teams

This assessment is completed as a team assignment. Each team has 4 to 5 members. You should ensure that the overall amount of work each member of your group does is equally divided.

If problems occur in a team that are not work-based, the team should initially attempt to mediate amongst themselves. Should this prove to be insufficient, issues should be directed to the course organiser. Likewise, any conflicts that cannot be resolved within the group will be mediated by the course organiser, on request.

Marking for each submission is detailed in the submission guidelines.

Each team member will be required to submit an evaluation of the team performance – rating themselves and other team members.

## Submissions

The assessment is split into three parts. Two marked submissions and a WebPA<sup>1</sup> contribution assessment.

Each marked submission will be marked out of 100. WebPA is used to weight the marks for individual team members subject to moderation by the MSc course board.

The relative weightings of the parts are:

Submission	Weighting
1 – Requirements, Planning and Design	50
2 – Prototyping, Usability and Evaluation	50
3 - WebPA	+/- 10
<b>Total</b>	<b>100</b>

## Assessment Regulations

<https://www.ed.ac.uk/academic-services/policies-regulations/regulations/assessment>

### Submission 1 Requirements, Planning and Design

This submission acts as the planning and design document for the second submission.

This submission should contain:

- Requirements engineering including function and non-functional requirements, capture methodology and prioritisation.
- Design of software – including architecture, component functionality
- Team structure and project planning including major task breakdown and time/effort estimates.
- Risk analysis including method applied and risk mitigation strategy.
- A user interface design for the prototype product, including an explanation of the reasoning behind your design, alternatives, where appropriate, and a consideration of accessibility requirements.

### Requirements Engineering

This section should describe the methods of requirements capture used and any alternatives that would also have been possible, and appropriate, to use. These methods should include the source of any requirements and the broad profiles of any people involved. The analysis of the requirements should produce a set of prioritised functional and non-functional requirements for the prototype.

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<sup>1</sup> <https://www.ed.ac.uk/information-services/learning-technology/assessment/webpa>

## Design

These requirements should be used to create a design for the prototype. This design should indicate which features of the design satisfies which requirements. The design should include a technology breakdown, component and system design and implementation paths.

## Team Structure and Planning

This section should contain the team structure that is employed in the assignment, including identified roles that the team members are assigned to and why. It should contain communication processes and how work is assigned to the team.

The planning section should contain the set of tasks required to complete the development of the prototype. This should incorporate the tasks required to complete both submission 1 and 2. Each task should have a time effort estimate – where a task is complete it should have an actual time effort elapsed value. The tasks should include dependencies and team members assigned to each task.

This section should include task descriptions and a Gantt Chart.

## Risk Analysis

This section should contain an outline of the risk analysis methods employed, risk mitigation strategies and the project's risks. This forms the risk register for the project. These risks should have their impact on the project detailed, including general effects and specific task and component impacts.

## User Interface Design

This should be a user interface design, it does not need to be a functional product. It should have the control flow for the product, the user interaction detailed and the reasoning behind the design. This will include alternatives that have been considered.

The design should consider how it addresses accessibility criteria for users with different accessibility requirements.

## Marking

Task	Weighting
Requirements Engineering	15
Design	15
Team Structure and Project Planning	20
UI Design	25
Risk Analysis	20

Quality of Presentation	5
<b>Total</b>	<b>100</b>

## Submission 2

This submission should use the first submission content to complete the assignment.

This submission should contain:

- Usability testing planning, including demographic of test cohort, usability test procedure and results analysis plan.
- The prototype for the product, which should implement your design for the product including user interface design (Submission 1).
- Usability analysis. Using the results of the planned usability test, the evaluation and conclusions should be presented, with changes and successes highlighted.
- Evaluation review of the overall assignment:
  - An evaluation of the state of your prototype and a plan for what you would do to further develop the prototype towards production quality product.
  - A project evaluation, including a discussion of your adherence to your original plan.

## Usability

This section should contain a detailed plan for carrying out usability testing on the planned user interface of your prototype. This should include the size and demographic of your test cohort (age, gender, education to name a few) and the usability testing procedures that you would follow.

It should include how you will analyse the results of the testing, including any methods you will use on quantitative data and how any qualitative data will be handled.

## Usability Analysis

This should contain the results of the usability evaluation. This should include a description of the usability tests you performed. It should also include a description of any deviations from both your proposed plan and user cohort and demographics which occurred when you actually carried out your tests. You should present your results and conclusions reached and the impact of these results on the design of the prototype's user interface.

## Prototyping

A prototype should be developed according to the design and plan developed in submission one.

This does not have to be a complete implementation - it is a prototype to demonstrate the viability of the design and the core functionality identified by the design.

This prototype should be a functional code base which can be used as a basis for further product development.

### Prototype and Project Evaluation

The evaluation should be an honest appraisal of the current prototype against the original design criteria set out in submission one. This should include if the design had to be altered, replaced or was suitable and the associated reasoning.

This prototype evaluation should include an outline plan for taking the prototype or components of it forward towards a production quality product.

The evaluation should include how your original planning matched with what actually occurred. Were the time estimates correct? Were the tasks appropriate? How did the team function against the original plan?

### Marking

Task	Weighting
Usability Evaluation Planning	25
Usability Analysis	25
Prototype Implementation	25
Prototype and Project Evaluation	20
Quality of Presentation	5
<b>Total</b>	<b>100</b>

### WebPA

The WebPA team contribution form covers 4 elements of team member assessment – for each element you will have 100 points to assign across the members of the team including yourself.

A more equal distribution of points means that all team members had a similar level of performance in that category.

Where a team member has performed above the average, they can be awarded more points to reflect this.

The 4 team member assessment elements are:

- **General**– how did the team member perform across the duration of the assignment? How were they to work with?
- **Collaboration** – how well/much did the team member contribute to the team, working with others and carrying out assigned tasks?
- **Timeliness** – Did the team member work to the schedule? Did they work in a manner that fit the timelines of the team?
- **Quality** – what level of quality did the team member produce during the implementation of designs and ideas including code implementation?

“The maximum this can vary the group mark for individuals without MSc course board intervention is plus or minus ten marks. This is subject to moderation by the MSc course board. Teams are expected to attempt to resolve any issues early, requesting the involvement of the course organiser if necessary, so a significantly negative mark modification should not be made without good reason. A team which assigns a significantly negative modifier to one member, without having previously contacted the course organiser with concerns about that one member, may be penalised for failing to do so.”

## Notes

### Quality of Presentation

The quality of presentation mark is intended to assess the coherency and readability of the presented work. This includes but is not limited to the structure of any submission, the quality of diagrams and charts, observance of good spelling and grammar, and the general readability of the work.

### Decisions

The assessment has many possible routes to completion - one of the main goals of the assessment is for you to show your reasoning and justification for your decisions. The assessment should show where you have considered alternatives and why you chose the options you have selected.

### Source Code Submission

Code should be held in a source code repository such as Git. The submission for any parts, which depend on code, should include a link to the associated source code repository.

### Assessment Format

The assessment part can be completed in different formats - should you wish to submit a format other than written report, contact the course organiser to discuss this.



## Appendix - Product Description

You should choose only one of the following two ideas.

### Idea 1

The product is a research tool for prospective undergraduate and postgraduate students to evaluate the educational opportunities at a range of universities. This tool can have a wide-ranging set of criteria – including degree programmes on offer, graduation rates, employment chances, quality of life measures and teaching excellence.

The product should draw on publicly available data sets and present these via the tool to the users – the user groups should be identified during the requirements engineering phase.

Users should be able to mix and match criteria to query the data on and link data sets without having to understand the underlying data structures or know where the data sets are located.

The results should be presented in an understandable manner to the user with interactivity and dynamic responsiveness two key requirements.

### Idea 2

The product is tooling for Twitter and open data set analysis to measure the general network and arising sentiment for given entry points, such as phrases, people, organisations or hashtags to the social media ecosystem.

This product should incorporate sentiment analysis of tweets, and temporal chaining to track how tweets evolve and propagate over time.

The topic or target of the analysis should be selectable by the user and the query mechanism should not be tied to a specific domain.

Users should be able to mix and match criteria to query the data on and to link data sets without having to understand the underlying data structures. The users should be able to filter out Twitter sources and data sets.

The results should be presented in an understandable manner to the user with interactivity and dynamic responsiveness two key requirements.