

# Network Systems for Game Development

## Assessment

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### Introduction

(This is the assessment specification for **CMP303**. If you're doing CMP501, please see Blackboard for the correct assessment specification.)

In this coursework, you will demonstrate your ability to design, develop and critically evaluate a network application with a focus on the technologies used in fast-action networked computer games.

You must **work on your own** for this coursework.

If you have any questions, please contact me ([a.sampson@abertay.ac.uk](mailto:a.sampson@abertay.ac.uk)).

### Requirements

Your application must demonstrate:

- a simulated world containing two or more moveable objects, at least one of which must be controllable by the user;
- network communication between machines (running either multiple copies of the same program, or two or more different programs);
- synchronisation of objects' positions between the machines, so that all machines are capable of showing a consistent view of the game world;
- using appropriate prediction and/or interpolation techniques to maintain smoothly-synchronised movement even when the network connection is affected by latency.

Your application may run on any operating system or platform. You may use external libraries, provided these are clearly acknowledged and don't prevent you from demonstrating the required skills.

### Choosing an application

You may implement any application you like provided it meets **all** of the requirements above. For example, you might choose:

- a multiplayer network game, where each player runs a copy of the game and controls their own character within the game world;
- a single-player game that can replicate its display onto other screens (e.g. for online observers, a tournament video wall or a flight simulator cockpit);
- an interactive simulation (e.g. Boids), where the user can influence multiple computer-controlled actors distributed across several hosts.

## Presentation

You will give a short presentation to me describing the design of the networking aspects of your application, in which you **explicitly justify your technical choices** using the knowledge you've gained from the module. For example, if you've chosen to use a peer-to-peer architecture, you should explain why that's an appropriate choice in the context of your particular application – e.g. you might talk about the expected number of players, the characteristics of the networks that players are likely to use, the requirements for efficiency of network communication, etc. You **don't** need to tell me what a peer-to-peer architecture is.

Your presentation should last no longer than ten minutes; there will be approximately five minutes for questions and discussion afterwards.

Your presentation should cover the following topics:

- the network architecture you've chosen (e.g. client-server, peer-to-peer);
- the application-layer protocol(s) that you've designed, and the transport-layer protocol(s) you've chosen;
- the network API you've chosen;
- how the networking code is structured, and how it's integrated with the rest of your application (e.g. using asynchronous IO);
- the prediction and/or interpolation techniques used;
- a critical discussion of the effectiveness of your solution (e.g. what kinds of network conditions will cause it not to work well).

I will assign you a presentation time **during the week beginning Monday 4<sup>th</sup> December 2017**; a list of these times will be available on Blackboard. If the time I suggest isn't possible for you, please get in touch with me as soon as possible to arrange an alternative.

I will provide a machine capable of showing slides **in PDF format**; you can either submit your slides to Blackboard before the presentation, or bring your own laptop if you prefer.

## Submission

You must submit a ZIP file containing the following:

- the complete source code for your application;
- a ready-to-run version of your application (e.g. a Windows `.exe` file);
- a short “read me” file (no more than a couple of paragraphs), in plain text or PDF format, describing how to use your application;
- the slides from your presentation, in PDF format.

To reduce the size of your ZIP file, please ensure that you have cleaned out any temporary files from your application's source code before submission – if you've used Visual Studio, then delete any `.obj`, `.ipch` and `.sdf` files. For external libraries, tell me a download link rather than including a copy of the library.

You must submit your ZIP file through Blackboard by **23:59 on Tuesday 5<sup>th</sup> December 2017**.

Feedback will be returned on **Friday 5<sup>th</sup> January 2018** (15 working days after submission).

## Grading criteria

This is a **summative** assessment: your final grade for CMP303 will be determined by your performance at the end of the module, as demonstrated in this assessment.

Grade	Implementation quality	Network architecture and protocols	Prediction and/or interpolation	Critical evaluation
<b>A</b>	High-quality application that operates flawlessly and meets all the requirements.	Entirely appropriate, well-thought-out network architecture and protocol design, presented and justified effectively by reference to the module content.	Techniques chosen to be appropriate in the context of the application, presented and justified effectively by reference to the module content.	A rigorous, critical evaluation of the techniques used in the context of the application, with useful reflective commentary.
<b>B</b>	High-quality application that meets all the requirements, with only minor flaws in implementation or operation.	Appropriate network architecture and protocol design, justified effectively with only minor omissions.	Techniques chosen to be appropriate in the context of the application, justified effectively with only minor omissions.	A critical and generally rigorous evaluation of the techniques used in the context of the application.
<b>C</b>	Good-quality application that meets all the requirements, but has some flaws in implementation or operation.	Generally appropriate network architecture and protocol design, with some weaknesses in the justification.	Generally appropriate choice of techniques, with some weaknesses in the justification.	A critical evaluation of the techniques used in context, with some missing details.
<b>D</b>	Application meets all the requirements, but has substantial flaws in implementation or operation.	Satisfactory network architecture and protocol design, appropriate for the application but with significant weaknesses in the justification.	Satisfactory choice of techniques with only adequate description and justification.	A satisfactory evaluation of the techniques used, with lack of critical consideration or context.
<b>MF</b>	Unsatisfactory application which does not demonstrate the required features.	Network architecture and protocol design which is inappropriate for the application or has not been adequately justified.	Techniques chosen are inappropriate for the application or have not been adequately justified.	Unsatisfactory evaluation, with missing or irrelevant details.
<b>F</b>	Performance well below the threshold level, with only limited evidence of achievement.			
<b>NS</b>	There is no submission, or the submission contains no relevant material.			