University of Lincoln
School of Computer Science
Assessment Briefing 2023-2024 Semester B

The use of AI tools to generate all or part of your assessment submission is **not** permitted unless specifically mentioned below.

Module Code and Title: CMP9785M Cloud Development

Contribution to Final Module Mark:
100%

Description of Assessment Task and Purpose:

This is Assessment <**Assessment 1**> and is an <**individual**> assignment.

Scenario:

You are working for a software company that provides development services to various commercial companies and your bosses have decided that the company needs to get into the provision of AI services to those commercial companies. The way they intent to do this, is to develop several commercial services that can then be integrated into their customers business. To do this, they want you to design and build an example AI-powered application that quickly demonstrates the potential for AI integration.

The purpose of this assessment is to **design and build an API** (application programmer interface) for a significant web application "back end" service, along with a client application that makes use of this API to demonstrate the service's functionality and the associated documentation for others to consume the API, with examples and architecture information.

To demonstrate your ability to develop cloud applications, your API should incorporate the following features:

- An account "sign up / login" system to allow creation of user accounts.
- A database for storing user/account usage information with appropriate access and interface.
- Authentication and security practices such that only authorised users can access the API.
- A credit system for access to functionality (i.e. user credits to be able to submit jobs)
- A queueing system of user submission requests for processing, gated by credits available.
- A notification system for notifying users when their submissions have been completed or any failure conditions.
- An API call to some external AI service with appropriate authorization (i.e. an external API).

Alongside the development of this API and client application, you should demonstrate professional practice in terms of using common development processes such as:

- Application design (scalability, deployment architecture etc)
- Price estimation for different levels of usage
- Source code control
- CI/CD (Continuous Integration, Continuous Deployment)
- Unit and Functional Testing
- API documentation

Your API **MUST** be developed locally (on lab PC's or your own computer) using the python based FastAPI library. We will provide a suitable install environment and discuss how to set one up in workshops. **IMPORTANT! NO OTHER TECHNOLOGY IS ALLOWED.** You may choose your own front-end client-side technology as the focus of this assessment is the back-end and integration but you **MUST** provide reasoned justification for your choices in your design proposal. You are expected to demonstrate your API working in a client application such that it could be deployed to any major cloud provider. You may want to investigate the available options for deployment, such as serverless functions or docker containers as part of workshop practice.

Note: The aim of this assessment is to focus on the development practice and server-side application rather than the "full stack" and client-side rendering, but it is expected that any application be professionally presented and perform as expected.

You will develop your API along with user documentation and testing evidence during class and in your own time. **You will be expected to provide evidence of continual development and testing as part of the assessment documentation**. Having a history of regular submissions to a source code repository is a fundamental part of your assessment evidence!

The overall assessment should include these elements, see CRG for marking scheme.

Design / Proposal Document

You must plan out your initial architecture and API design. This will be submitted as a design document that discusses the choices you intend to make and the justification for them. This is typically used as a proposal to management, so must be professionally produced and edited with appropriate diagrams and information from reliable sources.

A large part of the submission will be about the design aspects of the service (i.e. the specific service you are providing, not just "a service"), so the focus should be on identifying different architectures for development, provisioning, pricing, and documenting those choices to justify the final implementation. Note that the proposal should include the incorporation of a third-party AI cloud service in its architecture. This could be a language model, an image generator, or some other kind of Ai cloud service utilized as part of your application.

API development, evidence of professional practice and end-user documentation

You will develop the API described in your proposal document and evidence testing practice.

You will document your API and provide this as information via a web interface as part of your "client" web application. The intention is to give information on the functionality of the API and justification for its architecture as well as to give user examples of how to consume the API.

You will provide evidence of thoughtful testing of your API and architecture. Along with planning for test automation in your approach.

Please see the Criterion Reference Grid for details of how the presentation will be graded.

Learning Outcomes Assessed:

- [LO1] Critically evaluate and compare cloud-native application design to standard monolithic development practices.
- [LO2] Design and develop a secure, scalable cloud native application using a range of core services as part of a cloud systems development lifecycle.
- [LO3] Implement DevOps practices for continuous integration/continuous delivery and testing strategies.

Knowledge & Skills Assessed:

Subject Specific Knowledge, Skills and Understanding:

This will assess your ability to act professionally and develop web application back-end services and front-end examples, alongside professional practice in aspects such as CI/CD for deployment of commercial applications.

Professional Graduate Skills:

You will be able to demonstrate planning, documentation, professional practice in development.

Emotional Intelligence:

You will be expected to motivate yourself and provide peer support to other students. You will be expected to discuss in an adult manner any technical aspects of development and be able to navigate the technologies you have selected as well as access any help systems.

Career-focused Skills:

You will demonstrate portfolio skills, and particularly the development of commercial quality applications code.

Assessment Submission Instructions:

You should submit a single zip file to the "supporting documents" area of blackboard with your name and student number in the name of the zip. The zip file should contain the following:

- Your initial design proposal with justifications, pricing estimates, deployment etc.
- Your API design and architecture PDF (note this should also be on your website)
- A word document (6-8 pages) that discusses your performance and testing strategy along with evidence of it having been undertaken and a discussion of development process. In addition, a source control link to your codebase.
- The source code for your website, API, and client application + documentation

A single text document called "links.txt" containing the following URL's:

- A "video" URL link to a video that is accessible to markers. We suggest that you submit your video to Panopto or to YouTube and ensure the link is public (i.e. not private). See "format for assessment" for content requirements of the video.

Date for Return of Feedback:

Please see the school assessment hand-in dates spreadsheet available on blackboard on the left-hand menu bar.

Format for Assessment:

The assessment is broken into the following parts:

1. The proposal document (a word document of approx. 6-10 pages)
2. The API design justification and architecture diagram (evidenced as a web page(s) as part of your web application and supplied as PDF document)
3. The API implementation (evidenced by submissions to source control)
4. The client website and application (including documentation for the API)
5. A video demonstration of the client application, incorporating a demonstration of the API functionality, security, credit usage, data from an external API and any other professional practice you deem relevant. The video should be recorded at 1920x1080 resolution and typically be less than 10 minutes in duration with professional presentation.
6. A mini report (approx. 6-8 pages) demonstrating performance and functional testing practice along with a reflection on the development process undertaken.

Feedback Format:

You will be given verbal formative feedback in workshops. You will also be given summative feedback as part of your final submission.

Additional Information for Completion of Assessment:

We recommend you record your video using OBS (open broadcaster studio) and edit it with Davinci Resolve to create a high-quality portfolio item with appropriate presentation.

Note: You will be required to submit a link to your source code repository such that we can see the historical submissions and evidence of your development process.

Note: The assessment is about your own development, simply submitting tutorial code will not achieve a passing grade!

Assessment Support Information:

There will be regular lectures and workshops which you should attend.

Additional support is available during lecturer contact hours where available (see blackboard for contact information).

The assessment requirements will be discussed in class, so it is advisable to consider questions early.

Important Information on Dishonesty, Plagiarism and AI Tools:

University of Lincoln Regulations define plagiarism as 'the passing off of another person's thoughts, ideas, writings or images as one's own...Examples of plagiarism include the unacknowledged use of another person's material whether in original or summary form. Plagiarism also includes the copying of another student's work'. Plagiarism is a serious offence and is treated by the University as a form of academic dishonesty.

Please note, if you use AI tools in the production of assessment work **where it is not permitted**, then it will be classed as an academic offence and treated by the University as a form of academic dishonesty.

Students are directed to the University Regulations for details of the procedures and penalties involved.

For further information, see www.plagiarism.org