Faculty of Engineering, Environment and Computing
M19COM Advanced Software Design Development

Assignment 2 Brief 2018/19

Family Name(s)	Forename(s)		ID Number(s) (from your student card)
Module Title: Advanced Software Design Development	Ind/Group: Individual or Pairs	Cohort: 1819OctJan	Module Code: M19COM
Coursework Title: Assignment 2			Hand out date: 19/11/2018
Lecturer: Dr Hong Guo			Due date: **14/12/2018 *before* 18:00** **Upload in moodle**
Estimated Time (hrs): 25 Word Limit*: Not applicable	Coursework type: Software Design and Development Assignment		% of Module Mark 50%

Submission arrangement:

Online via CUMoodle.
Coursework submission not later than 18:00 by the due date via the CUMoodle Assignment 2 coursework submission links for uploading the report.

<u>You should submit electronic copy of your report that contains:</u>

- UML class diagram showing all relevant classes, the layers e.g. Domain, UI, Application layers and the design patterns used.
- UML sequence diagram for a main identified use case.
- Generated skeleton code from the sub-set of the design class diagram as part of the development process.
- Description and explanation of the design patterns applied with a discussion of how the process of round trip engineering would be applied as part of your development process together with consideration to commercial risk and risk management issues.

Important:
All the image files for the UML diagrams used must be clear and readable when inserted into your report.

If working in pairs it is **essential** that you clearly state on all submitted documents you and your partner's full names and SIDs.

Please also use the following naming convention for your submitted report:

Report_<FULL_NAME_SID> **(individual submission)**
Report_<FULL_NAME_SID_1>_<FULL_NAME_SID_2> **(pair submission)**

If working in pairs it is only necessary for one individual of the pair to make a submission as long as the above criteria and naming conventions for paired submissions are met.

The Faculty of Engineering, Environment and Computing Policy on Assessed Coursework applies to this coursework. You are advised to read the guidelines available on the EC Student Web on CU Portal. Keep a safe copy of all coursework submitted for reference.

Mark and Feedback date: 2 week after date of submission.
Mark and Feedback method: Feedback comments will be written on your script.

Module Learning Outcomes Assessed:

- Develop a practical understanding of high-level OO design patterns through the use of applied design and programming examples.
- Critically evaluate and apply appropriate advanced object-oriented software design patterns for a variety of design problems, while considering commercial risk and risk management issues.
- Use industry standard IDEs and UML CASE tool for each stage of the software design and development process.

Task and Mark distribution:

Assignment 2 Brief: High Altitude and Long Range Research Aircraft

Source content taken from: http://www.halo.dlr.de/index.html

HALO - The **H**igh **A**ltitude and **LO**ng Range Research Aircraft is a new Research Aircraft for atmospheric research and earth observation.

The concept behind HALO is to provide a platform for airborne atmospheric science and Earth observation using a well-equipped flying laboratory.

The HALO - aircraft is based on a production G550 business jet from Gulfstream Aerospace Cooperation and is equipped with several sensors. The designed software system must provide automatic monitoring and display of these sensors during a flight to the research crew.

The system will use the following primary sensors:

- Pressure
- Temperature
- Humidity
- Radiation
- Wind speed

The system must also provide the following derived measurement:

- Measurement of the 3-D wind field and turbulence (derived from Wind speed and pressure)

The user has a screen display that continuously indicates all six primary and derived measurements, as well as the current time and date.

The user can request the system to report the highest and lowest values of any of the five primary measurements during the previous 24 hour period.

The user will be able to calibrate the sensors against known values and to set the current time and date.

Working alone or in pairs, produce a design for the above system using UML Visual Paradigm (VP) or another appropriate industrial standard UML Case Tool that has automatic skeletal code generation features.

The design need not be fully complete, for example the user interface is not important, but you must include the following in your design document:

Task 1 – Design Class Diagram ***40%***

The class diagram of the overall software design that shows clearly appropriate use of the layers e.g. Domain, UI, Application layers. Your design should make appropriate and correct use of GRASP (**G**eneral **R**esponsibility **A**ssignment **S**oftware **P**atterns) and GoF (**G**ang **o**f **F**our) patterns.

Task 2 – Sequence Diagram ***25%***

A detailed design sequence diagram for the main use case for example "display readings". *This development is interdependent with (3).*

Task 3 – Detailed Subset Design Class Diagram ***15%***

A sub-set of the design class diagram in (1) showing the detailed design of the classes involved in the use case above. This must show:

- **a)** The types of all the attributes.
- **b)** The return types of all the methods
- **c)** The parameters and parameter types for all the methods. *This development is interdependent with (2).*
- **d)** Using an industrial standard UML CASE tool with automatic code generation features generate skeleton code from the sub-set of the design class diagram as part of the development process.

Task 4 – Description & Explanation ***20%***

In addition to the above tasks you will need to provide an explanation of the design process as follows:

- **a)** Add appropriate descriptions and explanations of your design and the patterns you used which also reflect on the design decisions you made.
- **b)** Discuss how the process of round trip engineering would be applied through the use of an industry standard UML CASE tool.
- **c)** Consider commercial risk and risk management issues related to the design / development process.

Additional notes:

- You are being marked on your design, but it might be helpful to produce a use-case model to clarify the required user functions first.
- You do not have to design in detail the components of the GUI, rather the functionality behind it. But sketches of the GUI might help you think about the problem.

Notes:

1. You are expected to use the CUHarvard referencing format. For support and advice on how this students can contact Centre for Academic Writing (CAW).
2. Please notify your registry course support team and module leader for disability support.
3. Any student requiring an extension or deferral should follow the university process as outlined here.
4. The University cannot take responsibility for any coursework lost or corrupted on disks, laptops or personal

computer. Students should therefore regularly back-up any work and are advised to save it on the University system.

5. If there are technical or performance issues that prevent students submitting coursework through the online coursework submission system on the day of a coursework deadline, an appropriate extension to the coursework submission deadline will be agreed. This extension will normally be 24 hours or the next working day if the deadline falls on a Friday or over the weekend period. This will be communicated via email and as a CUMoodle announcement.

Overall mark guidelines to students

0-39	40-49	50-59	60-69	70+	80+
Work mainly incomplete and /or weaknesses in most areas	Most elements completed; weaknesses outweigh strengths	Most elements are strong, minor weaknesses	Strengths in all elements	Most work exceeds the standard expected	All work substantially exceeds the standard expected

Mark allocation guidelines to students

Grade	Summary
First **≥70**	• Produce a design solution showing excellent use of UML class diagrams and sequence diagrams, for the overall design, detailed subclass diagram and skeleton code and a fully correct application of two or more basic GRASP patterns and an appropriate advanced design pattern. • Provide a comprehensive description and explanation of the design patterns applied while considering commercial risk and risk management issues related to the design / development process.
Upper Second **60-69**	• Produce a design solution showing very good use of UML class diagrams and sequence diagrams for the overall design, well-defined subclass diagram and skeleton code and a mostly correct application of two or more basic GRASP patterns and an appropriate advanced design pattern. • Provide a detailed description and explanation of the design patterns applied while considering commercial risk and risk management issues related to the design / development process.
Lower Second **50-59**	• Produce a design solution showing some good use of UML class diagrams and sequence diagrams for the overall design, mostly complete subclass diagram and skeleton code and a partially correct application of two or more basic GRASP patterns and an appropriate advanced design pattern. • Provide some description and explanation of the design patterns applied with some consideration commercial risk and risk management issues related to the design / development process.
Third **40-49**	• Produce a design solution showing satisfactory use of UML class diagrams and sequence diagrams for the overall design, partially complete subclass diagram and skeleton code and a partially correct application of an appropriate basic GRASP pattern and advanced design pattern. • Provide a limited description and explanation of the design patterns applied with limited consideration commercial risk and risk management issues related to the design / development process.
Fail **<40**	• A design solution showing incomplete / missing use of UML class diagrams and sequence diagrams for the overall design incomplete / missing subclass diagram and skeleton code and an incorrect / missing application of an appropriate basic GRASP pattern and advanced design pattern. • Minimal or missing description and explanation of the design patterns applied, with missing consideration commercial risk and risk management issues related to the design / development process
Late Submission	**0**

Note: *Marks will be lost for failing to follow the instructions above and for incomplete submissions, e.g. no or incomplete UML diagrams.*