Coursework Specifications

Contents

Module details

Module Code	**UFCFWK-15-2**
Module Title	**Operating Systems**
Module Leader	**Thomas Win**
Module Tutors	**Adam Gorine, Desmond Case, Martin Serpell**
Year	**2022-23**
Component/Element number	**CompA**
Total number of assessments for this module	**1**
Weighting	**100%**
Element description	**Portfolio containing presentation and demonstration**

Dates

Submission Date	**6th December 2022**
Submission place	**Blackboard, Assignments**
Submission time	**14:00 (2pm)**
Submission notes	**Please ensure that you work is submitted in an accessible format. (Ideally a PPTX or PDF)**

Feedback

Feedback provision will be	**Feedback will be published through Blackboard.**

Section 1: Overview of Assessment

This assignment assesses the following module learning outcomes:

- Show a detailed knowledge and understanding of the design, structure and implementation of modern operating systems (OS) as well as the data structures and interfaces of an OS (MO1)
- Write small utility programs, in both script and compiler level languages, that interface to the system primitives (MO2)
- Build and modify an OS, with particular application to user/system interface and memory sub-systems (MO3)
- Understand the security problems and solutions in an OS (MO4)

The assignment is worth **100%** of the overall mark for the module.

The assignment is described in more detail in Section 2.

This is a group assignment.

Section 2: Assessment specifications

The assessment for this module involves developing system calls for PintOS. It consists of two sub-components, namely,

1. Group-based system call development;
2. Individual-based system call exploitation.

Group-based system call development

In groups of **minimum** 3 to **maximum** 5 members, students will need to first select any **5** systems calls from a possible 13 PintOS system calls. Once selected, they will need to provide the implementations for them.

The following needs to be addressed in the selected system call development:

1. Tokenisation of user argument input from terminal;
2. Stack management and argument alignment;
3. Testing and integration of developed system calls.

The development will involve the use of:

- Rapid Application Development software development framework;
- Scrum project management.

Individual-based system call exploitation

Once the selected system calls have been developed, each team member needs to:

1. Select **1** system call from the **5** system calls developed;
2. Exploit the selected system call to get **root** access.

Students are free to use any memory exploitation techniques to achieve this.

Section 3: Deliverables

The deliverables for this project will be the following:

1. A **short** report covering (diagrams and screenshot where appropriate):
    a. Overall architecture of PintOS;
    b. System call design and development;
    c. Summary of system call exploitation (one per team member);
    d. Countermeasures;
    e. Gitlab link to code repository
2. A group presentation slide which summarises the aforementioned points;
3. Weekly Sprint project logs covering:
    a. Details of meeting (e.g., Date/Time, Location, etc);
    b. Project topics discussed;
    c. Development plans.

Section 4: Means of assessment

The means of assessment will be a in-class presentation and demonstration of project. This will take place during the practical sessions week taking place on the week commencing **12th of December 2022**.

The 20 minute presentation **and** demonstration session will consist of:

- Group presentation discussing the PintOS architecture and details of the development
- Individual presentation discussing:
    - The system call selected by each student for exploitation
    - Rationale(s) for choosing it (i.e., Why?)
    - Details of exploitation (How, what, etc)
    - Countermeasures

NB: In-class practical demonstration on the functioning of the system and exploitation required for both cases.

Section 5 Marking Criteria

NON-SUBMISSIONS are covered by UWE Regulations and generally attract zero marks

The following marking criteria will be used for the assessment of your presentation

Group component of the presentation (20%)

Outstanding **depth of content**; Comprehensive coverage of **PintOS architecture, system call development**	5	4	3	2	1	0	Poor content; No questions have been addressed
Outstanding **quality of presentation;** appropriate use of references and citations; excellent balance between visual and textual information; appropriate language; excellent use of diagrams/tables/screenshots	5	4	3	2	1	0	Poor quality of presentation; inappropriate language; no use of screenshots/diagrams/tables; demo not provided (either live or video)
Outstanding **structure**; includes introductory and presentation layout sections and clearly provides a summary and conclusions; member contribution is clearly identified on the slides; demonstrates excellent flow between the sections; sections logically organised and developed	5	4	3	2	1	0	Poor structure; no flow between the sections; member contributions not identified
The presentation is **coherent**, demonstrating an excellent flow.	5	4	3	2	1	0	Lacks coherence; little or no preparation

NB: Please see next page for the marking criteria for the individual component of presentation and demonstration

Individual component of the presentation (80%)

Outstanding depth of knowledge; in-depth presentation of the **individual system call exploitation** covered; answers demonstrate excellent understanding and insights on all aspects.	30	24	18	12	6	0	Poor depth of knowledge; answers demonstrate serious lack of understanding
Outstanding **presentation skills**; appropriate presentation style; use of appropriate language; looks and sounds confident in a well-balanced manner; excellent use of visual and textual information on the slides; excellent use of the slides. Well-paced and clearly audible without overreacting.	25	20	15	10	5	0	Poor presentation skills; lack of confidence. Relies heavily on the notes/slides.
Coherent presentation; **well-prepared** and connected	25	20	15	10	5	0	Poor preparation. Conflicts with other

with the rest of the presentation. Provides an outstanding flow.							sections. No flow.