



STRATHMORE UNIVERSITY
SCHOOL OF COMPUTING AND ENGINEERING SCIENCES
Master of Science in Information Systems Security
Final Examination

MST 8104: SOFTWARE LABORATORY EXPERIENCE I

DATE: 18th December 2024

TIME: 18:00-20:30 hours

Instructions: Answer question one and any other two questions

The owner of a *Health Clinic* requires you to develop software to facilitate the administration of the clinic activities. The basic requirements specifications for the system to be developed include the ability of patients making bookings and payments, and doctors being assigned to patients. Answer the following questions based on this write-up.

Question 1 (20 Marks)

- a) Define Java classes to illustrate inheritance scenario for such a Health Clinic software. **(5 Marks)**
- b) From a security perspective, clearly describe two reasons that will compel you to apply object-oriented programming to develop the software. **(4 Marks)**
- c) Illustrate any form of Polymorphism that can result from this *Health Clinic* scenario and state why it could enhance software security. **(3 Marks)**
- d) From a security perspective, clearly describe two reasons why exception control would be mandatory for your program. **(4 Marks)**
- e) It has been found that buffer errors are one of the top vulnerabilities for code created in C and C++. Illustrate a buffer overflow using code and accompanying explanations. **(4 Marks)**

Question 2 (15 Marks)

- a) With regards to computer security, describe any three reasons against the usage of frameworks for the development of the Health Clinic software. **(6 Marks)**
- b) Describe any three types of software security threats that you need to address in developing the Health Clinic software. **(6 Marks)**
- c) Describe any three ways that you can validate input that is coming from a source to the Health Clinic software. **(3 Marks)**

Question 3 (15 Marks)

- a) For the Health Clinic software, describe the relationship between code complexity and security. **(4 Marks)**
- b) Describe four security considerations that would determine the choice of programming language that you will use to develop the Health Clinic software. **(8 Marks)**
- c) In a nutshell, arrays can be used to implement buffers. Describe how this can be a problem and how it can be addressed. **(3 Marks)**

Question 4 (15 Marks)

- a) Assuming that the Health Clinic software is to be built as a mobile application, describe any three Activities that you may include to your application. **(3 Marks)**
- b) Would you advocate for a web application or a native mobile application? Support your answer with two reasons with respect to security. **(4 Marks)**
- c) An Iterator can be used to traverse a collection. Provide any possible alternative to an iterator. Support your response with an illustration. **(4 Marks)**
- d) Describe any two ways that you can apply the principle of least privilege, in the development of the Health Clinic Software. **(2 Marks)**
- e) Describe any two ways that you can mitigate the risks associated with third-party libraries used in the development of the Health Clinic Software. **(2 Marks)**