**Task**

This assignment is intended to be done in pairs.

Some people say you only understand something once you try to teach others. This assignment attempts to engage students in a hands-on learning experience by having them conceptualise, design, create, implement, and then reflect on creating a CTF-style challenge and the tutorials required to teach students concepts.

## Conceptualisation

You must conceptualise a cybersecurity/programming challenge based on your exposure to previous topics or through your research. Examples of challenges include programming, system commands, security tools, or something you have discovered independently.

This stage encourages students to think creatively and apply their knowledge novelly.

## Research and Design

After selecting a challenge, students will research and design the specifics, including the process a learner would undergo to solve it and the resources required for construction.

This stage involves critical thinking and problem-solving. You must anticipate potential obstacles and devise appropriate solutions.

## Implementation

Students will bring their design to life by creating the finished product, [a markdown document](https://developers.google.com/tech-writing/one/markdown#:~:text=Markdown is a lightweight markup,%2C bullets%2C and so on.) for CTFd, a Google form for peer review, build scripts for automation (if required), and a tutorial (in a recipe/poster format) for others on how to solve the challenge.

This stage showcases your technical expertise and ability to create comprehensive, user-friendly resources. The implementation process will encourage you to improve your documentation and communication skills.

## Reflection

Lastly, you will write a short reflection on the entire experience incorporating feedback from your peers. This reflection is intended to enable students to evaluate their process and identify improvement areas critically.

Outputs

You must produce a [markdown document](https://developers.google.com/tech-writing/one/markdown#:~:text=Markdown is a lightweight markup,%2C bullets%2C and so on.) with your challenge for CTFd.

You must produce your challenge material, including any build scripts and documentation, to allow the material to be deployed.

Additionally, you must construct two A3 posters (templates provided).

###### Poster 1 must include the following:

The conceptualisation of your challenge

* a brief description of your challenge
* explanation of the challenges relevant to networking, systems, and/or security

Research and Design

* Documentation of the challenge, including the intended learning outcomes
* required material

Reflection

* a short reflection discussing the following process, including the following points
* Overall experience
* challenges faced and how they were overcome
* areas of improvement
* the value of collaboration and peer feedback
* What was learnt, that could be useful in future projects

###### Poster 2:

You will provide your “recipe” tutorial. This recipe will guide the user step by step to solve the problem given.

Lastly, you must include a short note documenting:

* What percentage of work each member of the group did.

## Rubric

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Knowledge, Comprehension & Application** |  |  |  |  |  |
| **CRITERIA** | **EXPECTATIONS** | **POSS** | **STUDENT** | **GIVEN** | **MULTI** | **TOTAL** |
| **Poster 1**  (pairs) | You have submitted a **poster that effectively conveys your development process** for a cybersecurity challenge. | 2 | \_\_/2 | \_\_/2 | A x2  T x1 | A \_\_/ 4 T \_\_/ 2 |
| **Poster 2**  (pairs) | You have submitted a **poster of a comprehensive tutorial that guides users** through your cybersecurity challenge. | 2 | \_\_/2 | \_\_/2 | A x2  T x1 | A \_\_/ 4 T \_\_/ 2 |
| **Implementation**  (pairs) | You have submitted **evidence to implement your cybersecurity challenge**. This submission includes the required technical material, a markdown document for CTFd, and any necessary build scripts and documentation. | 2 | \_\_/2 | \_\_/2 | A x2  T x1 | A \_\_/ 4 T \_\_/ 2 |
| **Team work review** | You have submitted evidence of your **team review documentation**, including evaluating your team mates. | 2 | \_\_/2 | \_\_/2 | A x2  T x1 | A \_\_/ 4 T \_\_/ 2 |
|  | **Analysis, Synthesis & Evaluation** |  | | **SUBTOTAL** | | **A \_ / 22**  **T \_ / 8** |
| **Conceptualisation** | You have submitted evidence demonstrating **your ability to conceptualise** a cybersecurity challenge effectively. This evidence **showcases your understanding** of the subject matter, creativity in designing a relevant challenge, and strong **critical thinking skills**. By focusing on the conceptualisation process, you have laid a solid foundation for the research, design, implementation, and reflection stages of your project. Your evidence also highlights your **capacity to anticipate potential obstacles, devise appropriate solutions, and consider the needs of your peers and user**s. | 4 | \_\_/4 | \_\_/4 | - | \_\_/ 4 |
| **Research and Design** | You have submitted evidence showcasing **your aptitude in the research and design processes** for a cybersecurity challenge. This evidence highlights your ability to delve into relevant resources, gather necessary information, and create a well-structured plan for the challenge. By emphasising research and design, you have **demonstrated your critical thinking and problem-solving skills**, as well as your ability to foresee potential difficulties and devise appropriate solutions. Your evidence also indicates your proficiency in technical writing and the creation of clear, concise documentation. This achievement standard underscores the significance of thorough research and design in developing engaging and educational cybersecurity challenges. | 4 | \_\_/4 | \_\_/4 | - | \_\_/ 4 |
| **Implementation** | You have submitted evidence that **highlights your competency in implementing your cybersecurity challenge**. This evidence reflects your **technical expertise, attention to detail, and ability to transform your research and design plans into a functional, user-friendly challenge**. By emphasising the implementation process, you have **demonstrated your capacity to create comprehensive resources**, such as a markdown document for CTFd, a Google form for peer review, build scripts for automation, and a tutorial "recipe" for teaching others. Your evidence also showcases your proficiency in documentation and communication, essential skills for a successful cybersecurity professional. This achievement standard accentuates the importance of effective implementation in developing engaging and educational cybersecurity challenges. | 4 | \_\_/4 | \_\_/4 | - | \_\_/ 4 |
| **Reflection** | You have submitted evidence that emphasises **your capacity to reflect on your work** while creating a cybersecurity challenge. This evidence demonstrates your ability to **evaluate your project** critically, identify areas of improvement, and appreciate the value of collaboration and peer feedback. By focusing on reflection, you have shown your commitment to continuous learning and professional development in the cybersecurity field. Your evidence also **highlights your understanding of different perspectives and your willingness to refine your work** based on constructive feedback. This achievement standard underlines the importance of thoughtful reflection in fostering a deeper understanding of the subject matter and enhancing the overall quality of your cybersecurity challenge. | 4 | \_\_/4 | \_\_/4 | - | \_\_/ 4 |
|  | **Submission Guidelines** |  | | **SUBTOTAL** | | **\_\_ / 16** |
| **Overall submission quality** | **Assessment submission is ordered** and has a definite pattern to its construction. **The reader is not confused about the content in any given section and can follow the submission flow** easily. | 4 | \_\_/ 4 | \_\_/ 4 | A x2  T x1 | A \_\_/ 8 T \_\_/ 4 |
|  |  |  | | **SUBTOTAL** | | A \_\_/ 8 T \_\_/ 4 |
|  | DAYS LATE \_\_\_/7 = \_\_\_% |  |  | **FINAL** | | **A \_\_/48 T \_\_/40** |

## Rubric sections

##### Section 1: Knowledge Comprehension and Application

This section of the rubric consists of the required elements of the assignment. Students should take special care to include ALL these elements as they are often extended in the following sections

##### Section 2: Analysis, Synthesis, and Evaluation.

This section will evaluate your ability to include critical thinking and justification elements into your work. Often the requirements for extension are not explicitly given, so it will be up to you to decide how best to demonstrate what you have learned beyond the required unit goals and curriculum. Items such as 3D models, pictures, drawings, diagrammatic responses, notes, evidence of problem-solving, advanced programming concepts, elegant responses, media, etc., are all available options.

##### Section 3: Submission Guidelines

Students are expected to provide a submission that fulfils the requirements listed in style guides while also submitting at an appropriate quality. Be aware that points in this section could be 2- or 4-point items. Treat them accordingly.

## Submission

All submission items should be stored in an appropriate format. For example, code must be stored in a programmatical format so it can be evaluated (**images of code or code copied and pasted into a document may not be marked**)

Evidence of working material must be recorded where appropriate. For example, to show how your robot meets a requirement, you must submit a recording of it completing that requirement. Similarly, if you need to show how your program can download a file from the internet and crack a password, you must submit a recording of it doing that.

Ask the teacher if you are unsure if an element needs to be recorded**.**

All materials must be submitted to Google Classroom.

Students are responsible for keeping backups/master copies.

## **Scoring Notes**

Formatting for all typed/written assessments should be as follows:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Google Doc** | 11-12 Pt | 1.15-1.5 Line Spacing | 1 Space between paragraphs | Spelling and Grammar “Soft Limit” | In-Text Citations with footnotes | Title Page/Slide:   * Name * Date * Class * Aim * Assessment title |
| **Slides** | 10-12 pt. font text  14-24 pt. font titles | 1.0 1.15 Line Spacing | Bullet Points Preferred | Word Count per slide >100-110 “Soft Limit.” | Approved Templates and Themes |
| **Python** | We apply the following style guide to Python files. However, in general, most programs follow this overall layout.    [PEP 8: The Style Guide for Python Code](https://pep8.org/) | | | | | |
| **Arduino**  **C/C++** | We apply the following style guide to C/C++ files. However, in general most programs follow this broad layout.    I accept both K&R and K&R alternative bracing format. As long as it is consistent in your file.  [Arduino Style Guide for Creating Libraries | Arduino Documentation | Arduino Documentation](https://docs.arduino.cc/learn/contributions/arduino-library-style-guide) | | | | | |
| **Markdown** | We apply the following style guide to markdown documents. However, in general, most documents follow some variation of the following layout:    <https://github.com/google/styleguide/blob/gh-pages/docguide/style.md> | | | | | |

“Soft Limits” are not rigidly defined limits and will be assessed on a case-by-case basis. Ask for clarification on specific tasks

## Possible Scoring Groups are out of 2 or 4 Points.

##### 2-Point Criteria - Knowledge and Understanding

Criteria assessed as 2-Points are classified as Knowledge and Understanding criteria. These will examine and evaluate a student’s ability to effectively state facts and define terms and concepts. Analysis and synthesis of the information will not be assessed through these criteria.

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| --- | --- | --- | --- |
|  | **0 Points** | **1 Point** | **2 Points** |
| **2 Point Criteria** | **Not present** or **not able to be assessed** as the required criteria | Item is presented but **does not meet expectations** for quality, rigour, or detail. | Item is presented and **does meet expectations** for quality, rigour, or detail |

##### 4-Point Criteria - Analysis and Synthesis and Expert Review

To show true mastery of your developing skills, students must show that they can go beyond simple repetition of the given tasks or an explanation of processes. Students will demonstrate their ability to show higher-order thinking through analysis, evaluation, or linking multiple fields of learning to solve problems in novel ways.

## Analysis and Synthesis

Analysis and Synthesis components evaluate a student’s ability to effectively review data and understandings and develop these into a coherent and relevant statement. Analysis refers to the generating of thoughts from interpreting the data. In contrast, synthesis combines experience from one area with other pertinent knowledge to develop an original and compelling solution.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **0 Points** | **1 Point** | **2 Points** | **3 Points** | **4 Points** |
| **4 Point Criteria** | **Not present** or **not able to be assessed** as the required criteria | Evidence is presented and explained. However, it **does not show appropriate evidence of higher-order thinking** such as analysis, evaluation, or synthesis. | Evidence is presented and **shows appropriate evidence of higher-order thinking** such as analysis, evaluation, or synthesis. | Evidence is presented and **exceeds expectations for evidence of higher-order thinking** such as analysis, evaluation, or synthesis.  **-or-**  Item is presented and shows appropriate evidence of higher-order thinking such as analysis, evaluation, or synthesis and **exceeds expectations for quality or rigour** of understanding of the selected mastery. | Evidence is presented and **exceeds expectations for evidence of higher-order thinking** such as analysis, evaluation, or synthesis. **Additionally, this item exceeds expectations for quality or rigour** of understanding of the selected mastery. |

##### Expert Review

Expert Reviews evaluate a student’s ability to build solutions using the skills taught during the semester. Criteria assessed as 4-Points are classified as Analysis and Synthesis criteria. These will examine and evaluate a student’s ability to effectively review data and understandings and develop these into a coherent and relevant statement. Analysis refers to the generating of thoughts from interpreting the data. In contrast, synthesis combines experience from one area with other pertinent knowledge to develop an original and compelling solution.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **0 Points** | **1 Point** | **2 Points** | **3 Points** | **4 Points** |
| **4 Point Criteria** | **Not present** or **not able to be assessed** as the required criteria | Evidence is presented and broadly solves the problem. However**, the evidence does not show appropriate mastery** upon review. | Evidence is presented and broadly solves the problem. On review, it **does show appropriate evidence** of mastery. | Evidence is presented and solves the specific problem. On review, the evidence **shows understanding beyond expected mastery**.  **-or-**  Item is presented and broadly solves the problem. On review, it does show appropriate evidence of mastery and is **done so in a well-constructed or design method** that clearly shows higher levels of understanding**.** | Evidence is presented and solves the specific problem. On review, **the evidence shows understanding well beyond expected mastery** and is **done so in a well-constructed or designed method** that clearly indicates higher levels of understanding. |

##### Multiplier

Criteria will be combined with a **Multiplier**. While each criterion will be scored on the 0-1-2-4 scale, the multiplier will attach relevant worth to each criterion. Be aware of these multipliers and dedicate appropriate time to ensure you achieve your best result.

## Achievement Standards:

## Evidence of higher-order learning:

What is it that I mean by “higher-order thinking”?

It means I want you to go beyond replicating what we do in class. I want you to dig into your brain and understand why you did something, what about it was great, and what could be improved.

Why is this important? Reflective thinkers can go beyond what they are taught and can customise their learning to ben

