

Welcome to Orbital 25!



Outline

- General information
- The people factor
- Resources / Tools
- Level of achievements
- External Project
- Timeline of events
- Lift-off
- Mission control
- Milestones
- Splashdown

General Information

CP2106: Independent Software Development Project

- Teams of 2: Good teamwork and communication required.
- Workload: **140** in total or ~11 hours per week (per student)
- Compulsory events: Liftoff, 3 Milestones and Splashdown
- CS/CU grading

...you should have known all these by now since you have already applied and be accepted into the programme. ^_^

The People Factor: Facilitator

Dr. Zhao Jin

- zhaojin@comp.nus.edu.sg
- Zhao Jin on MS Teams



The People Factor: Advisers

Advisers (**one per team**) are senior students with software development experience

- Serve 3 roles:



Evaluator



Project Manager



Cheerleader

The People Factor: Mentors

Mentors (*Artemis teams only*) are senior students, faculty members and industry experts who want to pitch in and help guide student teams

- Provide more insights, resources and opportunities.

The People Factor: Tutors

Tutors are senior students, faculty members and industry experts with technical and project expertise

- Conduct workshops
- Provide technical and project support to teams

The People Factor: Peers

Other **teams** under the same adviser

- Meet up during group meetings, communicate via the Slack channel, etc.
- Discuss about ideas, share resources, give comments and feedback directly, etc.
- Give comments and feedback via Peer Evaluation

Resources / Tools

1. Email (IMPT)

- Announcements / Reminders

2. MS Teams (IMPT)

- Announcements and reminders
- Question and answering via the QnA channel.

3. Canvas Course (IMPT)

- For Live QnA, Mission Control

4. Skylab (IMPT)

- <https://nusskylab-dev.comp.nus.edu.sg/>
- (Public) Project gallery
- (Internal) Milestone submissions / Peer evaluation
- Use 'Forgot your password' with your NUSNET email address (e0...@u.nus.edu) to set your password and login accordingly.

5. Git + Github (IMPT)

- Required tools for source code version control.
- To be covered in Mission Control #1

6. Orbital website

- <https://orbital.comp.nus.edu.sg/>
- General information

7. Mega list of software development resources

- <https://soc-n.us/orbital25-resources>

8. Support for Entrepreneurship

- For teams who intend to commercialize their Orbital project (via a startup, App / Play Store, etc.)
- To-dos:
 - Think about the business side of your project early.
 - Indicate your interest at the end of Orbital
 - Obtain Intellectual Property from NUS and and apply for resources (e.g., funding, office space) from **SoC Furnace** and / or **NUS Enterprise** after Orbital

9. NOC (NUS Overseas Colleges)

- General info @ <https://soc-n.us/orbital25-liftoff-noc>.
- Briefing to be conducted as part of the Live Q&A session on **13 May (Tue), 4pm**
- To-dos:
 - Attend the briefing
 - Get started with [entrepreneurship](#)
 - Apply for NOC in Apr and Oct.

10. Testimonials

- For programmes such as NOC / SEP / Internship / Scholarship
- Available to all Artemis teams, as well as Apollo 11 teams who have strong support from their advisers / have won awards during Splashdown.
- Provided on a just-in-time basis (not for self-keeping / future use)

11. Awards

- **Judges' Choice Awards:** Top Artemis teams (overall) as selected by the panel of judges
- **Honorable Mention Awards:** Most popular teams with as determined by the live voting during Splashdown
- Certificates and prizes will be given to the winners.

12. AI Tools

- **You are NOT allowed to use AI tools to generate codes for your project or content for your Milestone submissions.**
- However, you are allowed to use AI tools to
 - self-learn (e.g., to understand what is CI/CD)
 - integrate with them for your features (e.g., to call ChatGPT API get answers on behalf of the users)
 - generate assets for your project (e.g., portrait images for the characters in your game)

Levels of Achievement



(Note: Teams might be downgraded to Vostok or removed from Orbital if they fail to meet the requirements of the targeted LoAs.)

Levels of Achievement

Features

(The requirements of a higher level implicitly include all requirements from the lower levels.)

- Vostok / Gemini
 - 1~2 / 3~5 feature of sufficient complexity in total
 - Use of database (workload must be justified otherwise if there is no database)
- Apollo / Artemis
 - 6~8 / 9+ features of sufficient complexity in total
- Note: Login / register and profile are not counted as features of sufficient complexity in general. In contrast, very complex features (Machine learning with extensive tuning) can be counted as multiple.

Levels of Achievement

Planning / Version Control

(The requirements of a higher level implicitly include all requirements from the lower levels.)

- Vostok / Gemini
 - GitHub repo + Basic version control (e.g., add / commit / push / pull)
- Apollo
 - Github issues with (monthly) milestones / labels / tags / assignee + Intermediate version control (branching, pull request)
- Artemis
 - 2-week sprint with objectives / allocation / tracking.
 - Github Projects + Code Review + CI/CD

Levels of Achievement

Design

(The requirements of a higher level implicitly include all requirements from the lower levels.)

- Vostok / Gemini
 - Use cases and features
 - Flow and architecture
- Apollo / Artemis
 - Design diagrams (drawn with tools)
 - Design principles + pattern
 - Design decisions

Levels of Achievement

Implementation

(The requirements of a higher level implicitly include all requirements from the lower levels.)

- Vostok / Gemini
 - Organization of files into folders
 - Code level comments

- Apollo
 - Coding standard

- Artemis
 - Code Review

Levels of Achievement

Testing

(The requirements of a higher level implicitly include all requirements from the lower levels.)

- Vostok / Gemini
 - System testing by the developers
- Apollo / Artemis
 - Multi-level (unit / integration / system) testing with automation + User testing
 - Proper test strategy (planning / test case design)

Levels of Achievement

Documentation

(The requirements of a higher level implicitly include all requirements from the lower levels.)

- Vostok / Gemini
 - Basic description of the system and the features
- Apollo / Artemis
 - Detailed description of features, quantification of complexity and justifications of design
 - SE evidence in every stage of the development process
 - 30+ pages / 50+ pages of README

Levels of Achievement

Quality of peer evaluation given

- Vostok / Gemini / Apollo / Artemis
 - Average feedback rating should be 2/3/4/4

Teamwork

- All levels
 - Proper contributions to the project (esp. in terms of coding) from **both** members of the team.

Levels of Achievement

- Discuss with your adviser for details and check for samples on Skylab → Gallery.
- Submit a request for change (e.g., upgrade / downgrade) to your adviser as early as possible.
- Your adviser will update your Level of achievement accordingly based on the Milestone evaluations.
- Note: Most projects can be done to any level of achievement.

Levels of Achievement

- For upgrading to **Artemis**, the team should show sufficient progress with respect to the requirements in Milestone 1 & 2.
 - Note: The requirement of Agile Development with 2-week sprints and is strict.
- Qualifying teams will be shortlisted and considered for Artemis in Milestone 3.
- No such requests will be entertained after Milestone 2.

Timeline of events

Mandatory events:

12-19 May - Liftoff

2 June - Milestone 1 - Ideation

30 June - Milestone 2 - Prototyping

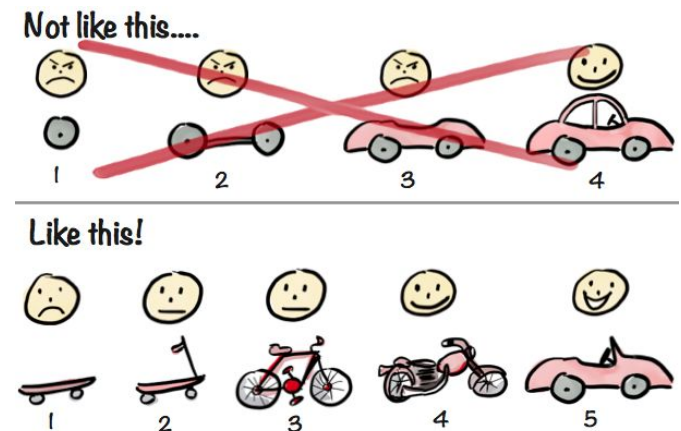
28 July - Milestone 3 - Extension

27 August - Splashdown - Refinement

Optional events:

17/24/31 May, 7 June, ... - Mission Control Workshops

Iterative Development



Objective

- Get started with the project!

Activities

- (Compulsory) Programme overview
- (Optional) Live Q&A sessions
- (Compulsory) Meet-your-adviser
- (Compulsory) Poster & video submission
- (Compulsory for Artemis Teams) Mentor matching

Lift-off

Programme overview and live Q&A sessions

- Read this set of slides carefully ^_^
- Post your questions in the QnA channel
- Attend the live Q&A sessions for clarifications
 - **13/15 May** (Tue/Thu), 4pm (via Zoom, links available in Canvas)
 - with an additional briefing from NOC in the first session.

Lift-off

Meet-your-adviser

- Have an online meeting / discussion with your adviser

Poster & Video submission

- An A4-size poster (<Team ID>.jpg or .png)
- A ~1-minute presentation video (<Team ID>.mp4)

Example:

1999.jpg (poster) and
1999.mp4 (video).

See the next few slides for instructions
about how to find your Team ID on Skylab.

- Must be succinct and persuasive
- Google “elevator pitch”, or “one minute madness” for more information
- Samples: <https://bit.ly/orbital18ignition>

Lift-off

Poster & Video submission

- Also required for future [Milestone submissions](#) (w/ harder requirements).
- Important to get things right from the start!
- General tips / tools from CFG
<https://soc-n.us/orbital25-liftoff-poster-video>

Poster & Video submission

- Deadline: **19 May (Mon), 2pm**
- Send the links to **your adviser (NOT Skylab!)**
 - The links should be **Google Drive File Links** and **publicly accessible**
 - The files should be **named correctly**
- Teams who do not follow the instructions closely are subject to removal

Lift-off

To find out your team ID on Skylab

- After logging into Skylab, click on the team name button on the right of your name

Demo student 1 in 

Lift-off

To find out your team ID on Skylab

- Take note of your team ID (a 4-digit number) shown on this page.

Team name: Demo Team 1

Team id: 1111

Project level: Apollo 11

- Other basic information (e.g., level of achievement / adviser) can also be found on this page.

Lift-off

(Artemis Teams only) Mentor matching

- Prepare the materials (updated proposal, poster and video) and share them with the mentors via the forum in Skylab by **15 May (Thu), 2pm**
- Communicate with the mentors to reach an agreement
- Email Jin to confirm the allocation by **26 May (Mon), 2pm.**

Mission Control

Objective

- Get some technical help and project advice!

Activities

- Technical help sessions
- Project consultations

(Check Email / MS Teams for details)

Mission Control

Workshops

- Crash courses on specific technologies (e.g., Git, React, Unity) from the tutors
- Sign-up and proper preparation required.
- Details available in Canvas

- Via Zoom and recorded on a best-effort basis
- Release of materials in the following week

Mission Control

Project Consultations

- 20 minutes per session
- Get comments and advice specific to your project from a tutor / adviser / industrial expert
- Sign-up and proper preparation required.
- Details available in Canvas

- Via Zoom but not recorded

Mission Control

Tentative Schedule

Mission Control #1 (17 May):

- Web App Development: React (Part 1)
- Databases (Part 1)
- Game Development: Turbo
- Mobile App Development: React Native (Part 1)
- General Tools: Git / GitHub
- Huawei Talent Portal

- Project Consultations

Mission Control

Tentative Schedule

Mission Control #2 (24 May):

- Game Development: Unity (Part 1)
- Web App Development: React (Part 2)
- Database: Relational Databases (Part 2)
- Mobile App Development: React Native (Part 2)
- Asset Management + Multiplayer Gaming
- Software Engineering (Part 1)

- Project Consultations

Mission Control

Tentative Schedule

Mission Control #3 (31 May):

- Machine Learning (Part 1)
- Game Development: Unity (Part 2)
- Deployment (Part 1)
- Software Engineering (Part 2)
- Generative AI
- API Design and Integration (Part 1)

Mission Control

Tentative Schedule

Mission Control #4 (9 June):

- Machine Learning (Part 2)
- Deployment (Part 2)
- API Design and Integration (Part 2)

Mission Control #5 (mid-July):

- Project Poster and Video

Milestones

Objective

- Give a progress update and get feedback.

Activities

- Project work
- Milestone submission
- Milestone evaluation

Milestones

Project work by 2 Jun - Milestone 1 (Ideation)

- Formulate your project idea clearly
- Identify the features for your system
- Design your system
- Create a development plan
- Pick up the necessary technologies
- Build a **technical proof of concept** (e.g., an integrated frontend+backend with the login/register feature)
- Document your system

Milestones

Project work by 30 June - Milestone 2 (Prototype)

- Implement the prototype of your system, which should contain the most essential features
- Perform system testing
- Document your system

Milestones

Project work by 28 July - Milestone 3 (Extensions)

- Extend your system by adding more useful features
- Perform system / user testing
- Document your system

Project work by 27 August - Splashdown (Refinement)

- Not an official Milestone
- Polish up your system and fix outstanding issues

Milestones

Apollo 11 teams are expected to complete **more work of higher quality within the same timeline.**

Artemis teams are expected to complete **more work of higher quality roughly one Milestone ahead** (e.g., completion of technical proof-of-concept within Liftoff).

Milestone Submission

Milestone X

-
- Submit to **Skylab (NOT your adviser)** for all 3 Milestones
 - Submission deadlines:
 - Milestone 1: 2 June, 2pm (SGT)
 - Milestone 2: 30 June, 2pm (SGT)
 - Milestone 3: 28 July, 2pm (SGT)

Milestone Submission

Milestone X

- Submissions consist of:
 - README
 - Project Log
 - Project Poster
 - Project Video

(Note: You may prepare the documents in Google Docs or other types of online documents, and copy the content over or save the link into Skylab.)

What should be included in README?

- Your level of achievement, project scope (one sentence version and a longer descriptive version), as well as
 - Milestone 1 (Ideation): include problem motivation, proposed core features / user stories, design and plan
 - Milestone 2 (Prototype): include core features developed, problems encountered
 - Milestone 3 (Extension): include bugs squashed, edge features developed, problems encountered, and user testing
- ... and any other info that justify your LoA!
- Note: The README should incorporate all (but possibly condensed) information from a previous one

What should be included in Project Log?

- What were the tasks performed by each member?
- When were the task performed?
- How many hours were spent in completing each task?

(Note: The total number of hours spent for **each member** should be at least 140 hours at the end of the programme.)

A Very Bad Example

- We are planning to build a website for selling secondhand textbooks.
- Project Log
 - Team Meeting: 40 hours.

Good Examples

<https://soc-n.us/orbital-ms-sample-1>

Note: This is sufficient for Project Gemini.

<https://soc-n.us/orbital-ms-sample-2>

Note: This is sufficient for Artemis.

Excellent Examples

<https://soc-n.us/orbital-ms-sample-3>

<https://soc-n.us/orbital-ms-sample-4>

Note: This is written by the top **Artemis** Teams from Orbital 22 for **Milestone 3**.

Project Poster & Video

- Milestone 1: Showcase your formulated project idea and technical proof of concept
 - Similar to Liftoff submissions but more details required.
- Milestone 2 & 3: Showcase your prototype / complete system
 - Poster: **A1 size**, multi-panel / segment
 - Video: ~5 minutes

An Excellent Example



Promoting Personal And Neighbourhood Pet Stewardship through community, healthcare awareness and early detection of zoonotic and notifiable diseases

- Monitoring disease status of companion animals
- Increasing public awareness on zoonotic diseases and prevention
- Aiding veterinarians in diagnosis, prevention and treatment practices
- Gather and share information companion animal diseases through crowdsourcing at a national level to improve the health and well-being of our pets



Community Centric Design : A Data-Driven Survey and Analysis Approach

- A survey was crafted with 41 questions
- Approximately 100 Pet Owners and Lovers completed the survey @ Pet Expo
- Data was then ingested, Extracted, Transformed and Visualised via Microsoft Fabric Reports
- Concluded the key features that Singaporeans want in WagTrack : Pet Care Resources, Symptoms and Medication Tracking

Established SWE Practices : System Design and Principles & Testing

- ✓ SOLID Principles
- ✓ AGILE
- ✓ CI / CD
- ✓ GIT Version Control
- ✓ GitHub Projects
- ✓ Unit Testing
- ✓ User Testing
- ✓ System Testing

Ensuring Product-Market Fit : Understanding of the Pet Care Scene in Singapore

- WagTrack's design process was informed by input and preliminary feedback from animal health professionals
- WagTrack was part of the 2024 NParks Youth Stewards for Nature programme with mentors from AVIS
- Regular meetings with our Tech Industry Mentor also enabled us to explore different technology use cases
- By working closely with industry professionals, we ensured that WagTrack's application development was grounded in the realities of the pet care landscape



WagTrack Features

- Home**
 - Community Pet • Personal Pets
 - Pet Care Resources • Authentication

- App Settings**
 - Data Consent • Onboarding • FAQ
 - Permissions • Legals • Support

- Pet Details**
 - Weight Log • Ownership Rights
 - Pet Details CRUD

- Pet Posts**
 - Social Media Postings CRUD
 - Filter • Comments • Like • Share

- Explore**
 - My Posts
 - For Me

Symptoms Tracker

- Symptoms CRUD • Tagging • Help

Medication Tracker

- Medication CRUD • Tagging
- Session Planner • Vaccination

Reports

- News and Events • Analytics
- Interactive Map of Cases

Notifications

- Recurring Notifications
- Feature Specific

FEEDBACK & PRAISE

— Animal Health Professionals, YSN Mentors —

WagTrack is intuitive and user friendly. Its features address animal care needs in a way that is accessible to pet owners and has potential to improve pet wellbeing. Its design shows clear attention to detail with a focus on creating a positive user experience.

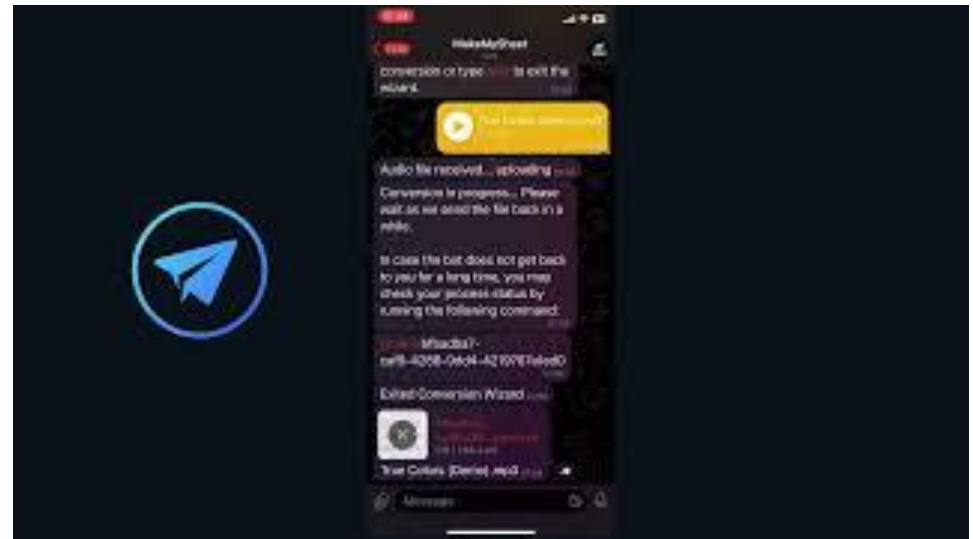


13 - 28 July 2024
Featured @ HortPark

Presented to Senior Minister as part of Youth Steward of Nature Project 2024.
Application Poster was featured in HortPark.



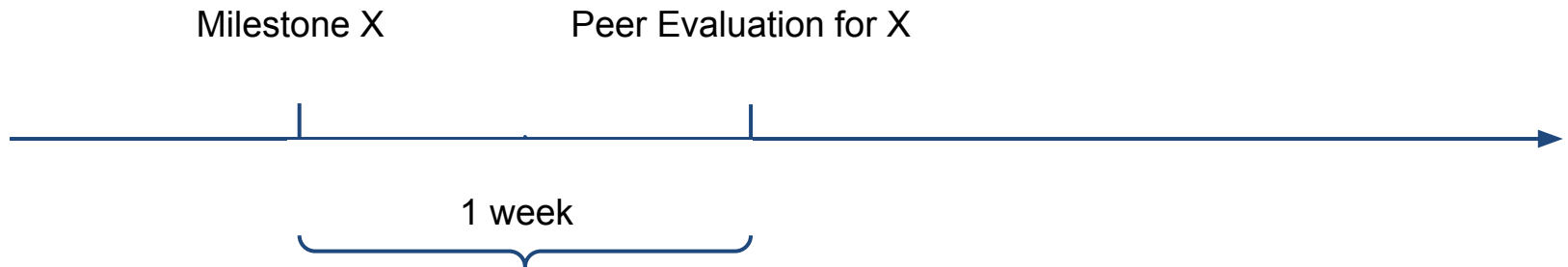
Winners of Best Project Poster / Video Award from Orbital 24



What will be asked in the evaluation form?

- Is the problem well defined? Is it clear what need the system is trying to satisfy? Is there a real need to solve the problem?
- Are the features of the system clearly specified?
- Is there a draft plan for next development cycle?
- Sample Evaluation Forms
 - Milestone 1: <https://soc-n.us/orbital-ms-eval-1>
 - Milestone 2: <https://soc-n.us/orbital-ms-eval-2>
 - Milestone 3: <https://soc-n.us/orbital-ms-eval-3>

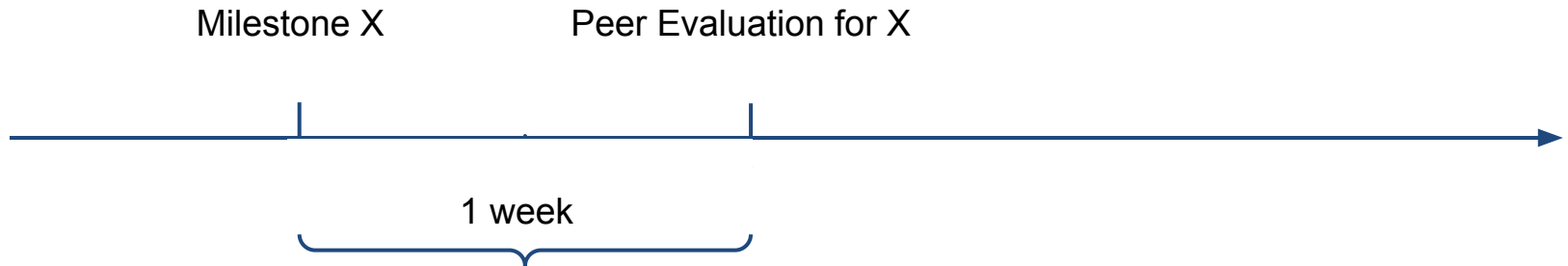
Peer / Adviser Evaluation



Teams also evaluate their peers (3 other teams)

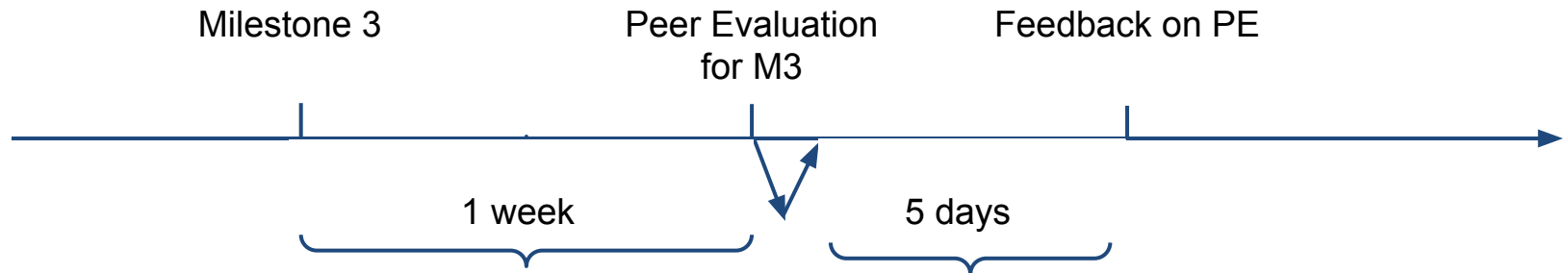
- Fill out the evaluation form on Skylab based on the materials presented by each team.
- Helpful and critical constructive comments required for higher levels of achievement.

Negative Feedback




- Constructive (negative) feedback is also part of the form, and is source-anonymized for the receiving team.
 - Advisers and other staff can see identity of anonymous contributors.

Feedback on Peer Evaluation



- Final milestone has additional feedback cycle; i.e., evaluate the peer evaluators.
- Obtaining good peer feedback scores is also part of the higher levels of achievement.
- Most teams will evaluate the same peer teams throughout Orbital.

Submission page on Skylab

[Home](#) [Staff](#) [Projects](#) [Forum](#) Welcome, Demo student 1  [Logout](#)

Demo student 1 in Demo Team 1

[Submit project log](#) [Evaluate other teams](#) [View peer evaluations](#) [Submit feedback](#) [Preview Forms](#)

Submissions

Submit Submission Instruction

Milestone Name	Last updated at	Actions
Milestone 1	2017-05-29 11:55 PM	Create
Milestone 2	2017-06-26 11:55 PM	Create
Milestone 3	2017-07-24 11:55 PM	Create

Splashdown

Objective

- Showcase your project, win awards and get ready for the next stage!

Activities

- Poster presentation
- Invited talks
- Award ceremony

FAQs

- Level of achievement / mentorship
 - Can we upgrade to Artemis later without any mentor guiding us?
 - Yes.
 - For artemis teams, is it one team to one mentor or can one mentor have multiple teams?
 - Most mentors would only take one team so please do make effort in persuading them.
 - Can an Artemis team with mentorship drop to Apollo 11 before milestone 3?
 - No. An Artemis team with mentorship is required to persist through and be evaluated at Artemis level.

FAQs

- Level of achievement / mentorship
 - What is considered evidence of software engineering for Apollo 11 and Artemis?
 - Software engineering is the systematic application of engineering approaches to the development of software. Please check out the [CS2103 website](#) for the core concepts and recommended practices. You should provide details in your Milestone submission showing that you understand the concepts and have applied the recommended practices.
- Will advisers recommend the suitable level of achievement for our project?
 - Yes. Please discuss with your adviser proactively.

- Project Work
 - Can we change our project idea?
 - It is ok for you to update / change your project idea.
 - However, the more changes you are making the more time you need to work out the details / learn the required technologies. You might end up having difficulties in meeting the stated deadlines (which will not be extended for such reasons).
 - Nevertheless, if your concern is that your existing idea is too difficult, please discuss with your adviser to simplify it first.
 - If is just a change of interest, please think carefully whether it is worthwhile to give up the work done and restart.

FAQs

- Project Work
 - How do I get started with the project work?
 - You can start by figuring out as many details about your project as possible. For example: What are the key features? what is the system design? What is the tech stack? What good software engineering practices your team will be following?

- Project Work
 - How do I identify the most suitable tech stack for my project?
 - For most Orbital projects, any tech stack should be sufficient. But do take note that some might be more difficult to learn.
 - Can I use resources (e.g., external APIs, real-life data, game assets) that are not created by my team?
 - Yes. But **you must give credits properly** to the resources that you have used. Such resources won't be counted as the work you have done in Orbital (but the effort of integration may still be counted if it is non-trivial).

FAQs

- Project Work
 - What happen if my project require permissions to use such resources?
 - It is non-trivial to obtain relevant permissions / pay for the license fee so you might need to choose something publicly available or have some backup plans.
 - Here are a few possible alternatives for your consideration.
 1. Check if there are unofficial wrappers for the APIs (and do not spam requests to avoid being caught).(Answer continues on the next slide)

FAQs

2. Design your own mock APIs + Database (with dummy data) so that your system uses those instead of communicating with the actual APIs. The dummy data can be manually created / scraped from some webpages. (If you are aiming for higher levels, you can even design your system in a way such that it is easy to plugin any APIs as needed.)

3. Shift the focus of your project / redesign your feature. This is part of the flexibility of Orbital. So please don't be afraid to do so. For example, if you cannot obtain real time data for bus arrival, you can make use of historical data / the schedule and ask your user for input to update the estimates.

FAQs

- Project Log for Milestone submission
 - Do we have to specify how many hours each member has spent on a particular task?
 - Yes. The workload requirement of 140 hours is for each student in the team.
 - Can anything related to the project be recorded in the log?
 - Yes. Anything related to the project / Orbital can be recorded in the log. But please make sure that a substantial portion of the time is on project work (e.g., it does not make sense to claim that you have self-studied for 135 hours but only done 5 hours of project work).

All the best!
