UNIVERSITY OF PADOVA
DEPARTMENT OF INFORMATION ENGINEERING

Biomedical Wearable Technologies
for Healthcare and Wellbeing

Exam and Project Discussion Q&A

A.Y. 2023-2024

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DEPARTMENT OF
INFORMATION
ENGINEERING
UNIVERSITY OF PADOVA

Outline

- **The theory exam**

- Project delivery instructions
- Project presentation guidelines

Exam structure

Written test of 90-minute duration:

- 10 multiple-option questions (only one correct answer)
- 5 true/false questions
- 3 open questions

Notes:

- The exam is in English, answers to be provided in English (English errors not penalized). Dictionary is not allowed.
- At the exam, the students cannot use any course material (slides, books, articles, etc.), nor any electronic device (e.g., smartphone, notebook, etc.). Only the pen and a calculator is allowed.
- The theory exam will cover all the theory program except the material marked as BONUS

Mark of the theory exam

- Multiple-option questions:
  - 1 point for each correct answer
  - -0.33 points for each incorrect answer
  - 0 points for each not given answer
- True/false questions:
  - 1 point for each correct answer
  - -0.33 points for each incorrect answer
  - 0 points for each not given answer
- Open questions:
  - 0 to 5 points each
- Total score: up to 30 points

Final mark

- The written exam is passed if the student gets at least 18/30 points.
- To get the final mark, students must pass both the written exam and the project discussion.
- The mark of the project is up to 12/30 (based on Q&A project discussion, different students in the same group can get different marks for the project).
- The vote of the theory exam accounts for 2/3 of the final mark.

$$final\ mark = \frac{2}{3} \cdot mark\ of\ the\ theory\ exam + mark\ of\ the\ project$$

Examples of multiple-option questions

Q1. A diffuse-reflective optical sensor:

a. is made of two separate components, a light emitter and a light detector, and the sensing object is interposed between these two components.

b. is made of two separate components, a light emitter and a light retroreflector, and the sensing object is interposed between these two components.

c. is made of a single component integrating both a light emitter and a light detector.

d. none of the previous options.

Examples of multiple-option questions

Q1. A diffuse-reflective optical sensor:

a. is made of two separate components, a light emitter and a light detector, and the sensing object is interposed between these two components.

b. is made of two separate components, a light emitter and a light retroreflector, and the sensing object is interposed between these two components.

c. is made of a single component integrating both a light emitter and a light detector.

d. none of the previous options.

Examples of multiple-option questions

Q2. What is the most appropriate use of the following HTTP request?

```
POST /library HTTP/1.1
Host: www.example.com

{
  "Author": "Stephen Hawking"
  "Title": "A Brief History of Time"
}
```

a. Delete the book with author "Stephen Hawking" and title "A Brief History of Time" from the book list at the URL www.example.com/library
b. Adds to the book list at the URL www.example.com/library a new book with title "A Brief History of Time" and author "Stephen Hawking"
c. Replace the book list at the URL www.example.com/library with the book list containing the book "A Brief History of Time" by "Stephen Hawking"
d. None of the previous answers

Examples of multiple-option questions

Q2. What is the most appropriate use of the following HTTP request?

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POST /library HTTP/1.1
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c. Replace the book list at the URL www.example.com/library with the book list containing the book "A Brief History of Time" by "Stephen Hawking"

d. None of the previous answers

Examples of multiple-option questions

Q3. The Diffie-Hellman protocol can be used to:

a. Generate a shared secret key, without the need to exchange the key through a communication channel.

b. Authenticate two communicating parties.

c. Perform the digital signature of a message.

d. None of the previous answers.

Examples of multiple-option questions

Q3. The Diffie-Hellman protocol can be used to:

a. **Generate a shared secret key, without the need to exchange the key through a communication channel.**
b. Authenticate two communicating parties.
c. Perform the digital signature of a message.
d. None of the previous answers.

Examples of true-false questions

Q4. Amperometric electrochemical sensors measure the current between the working electrode and the counter electrode, while the potential of the working electrode is fixed.

TRUE

Examples of true-false questions

Q5. TCP (Transport Communication Protocol) is an unreliable connectionless protocol of the transport layer.

FALSE

Examples of open questions

Q6. Given the results of 5 SUS questionnaires collected by 5 participants evaluating an app A:

$SUS_A = 65, 80, 93, 78, 54$

- Calculate the confidence interval at 90% : **74 ± 14.25**
- Evaluate if an app B (evaluated by the same 5 participants) with SUS:

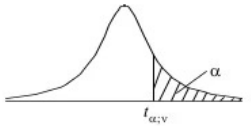
$SUS_B = 90, 90, 87, 95, 91$

can be said to be significantly more usable with a level of confidence >= 0.05:

t = 2.30 → NO (if it was >= 0.1, YES)

Table of the Student's *t*-distribution

The table gives the values of $t_{\alpha;\nu}$ where $\Pr(T_\nu > t_{\alpha;\nu}) = \alpha$, with ν degrees of freedom



ν \ α	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
1	3.078	6.314	12.076	31.821	63.657	318.310	636.620
2	1.886	2.920	4.303	6.965	9.925	22.326	31.598
3	1.638	2.353	3.182	4.541	5.841	10.213	12.924
4	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	1.319	1.714	2.069	2.500	2.807	3.485	3.767
24	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	1.296	1.671	2.000	2.390	2.660	3.232	3.460
120	1.289	1.658	1.980	2.358	2.617	3.160	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.090	3.291

Examples of open questions

Q7. Provide a brief description of the following HTTP methods: GET, HEAD, POST, PUT, DELETE.

Possible answer:

- GET: Method used to request the server to send a page or an object. It only retrieves data.
- HEAD: Method used to ask for the response message header, without requesting the actual page content.
- POST: Method used to ask to upload data to a server. With POST the client asks to the server to accept the entity enclosed in the request as a new subordinate of the resource identified by the request URL.
- PUT: Method used to ask to write a content in the server to the specified URL. If the request URL refers to an already existing resource, the server replaces the existing entity with the new enclosed entity.
- DELETE: Method used to ask to delete the content in the server at the specified URL.

Examples of open questions

Q8. List and briefly describe at least 5 of the 7 main principles of the GDPR.

Possible answer:

1. Lawfulness, fairness and transparency: Personal data shall be processed lawfully, fairly and in a transparent manner in relation to the data subject.
2. Purpose limitation: Personal data shall be collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes.
3. Data minimisation: Personal data shall be adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed.
4. Accuracy: personal data must be accurate and, where necessary, kept up to date.
5. Storage limitation: personal data shall be stored in a form which permits identification of data subjects for no longer than is necessary for the purposes for which they are processed.

Outline

- The theory exam
- **Project delivery instructions**
- Project presentation guidelines

General info

- In the following, we reported the instructions on how to deliver your project. In a nutshell, you must prepare and submit a **.pdf file** containing
  - the number of your group and the name of each group participant
  - the link to a public GitHub repository containing a ”valid” version of the code

- Since the project must be delivered through GitHub, code delivered via mail will be ignored

- “Valid” code must be in the **master** (or **main**) **branch** and must have been committed no later than the **14/07/2024**, and no later than the **day before the project discussion date**.

Example scenario

- ”I belong to Group 50 composed by me, Martina Vettoretti, and Luca Cossu”

- “My code is located in my public repository named bwthw”

Step 1: Fill the group info

- Create a .docx file

- Fill the group info at the very top of the file, e.g.:

Group 50

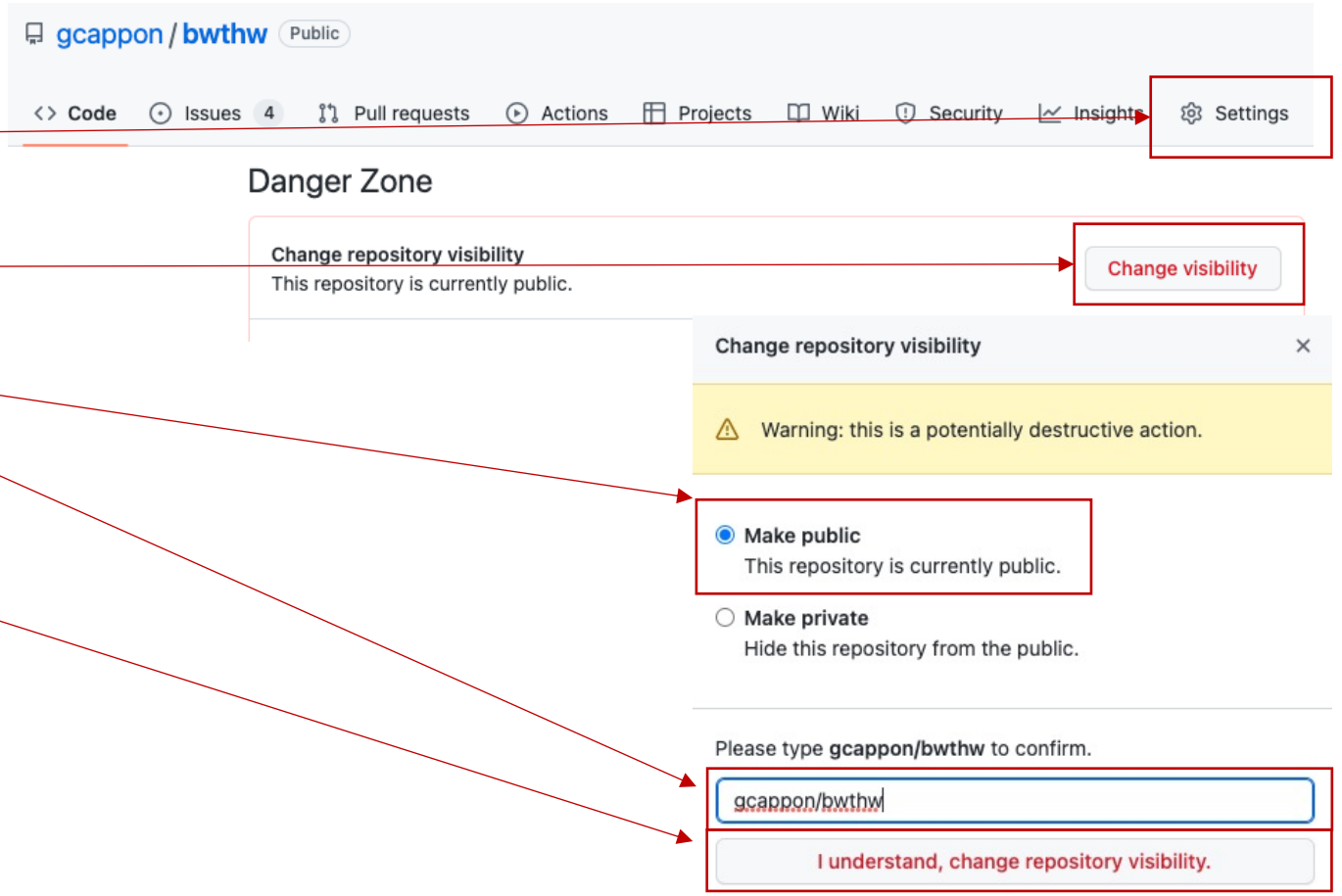
Group members:

ID	Name	Mail
1234567	Giacomo Cappon	giacomo.cappon@unipd.it
1234568	Martina Vettoretti	martina.vettoretti@unipd.it
1234569	Luca Cossu	luca.cossu@phd.unipd.it

Step 2: Make your repository public

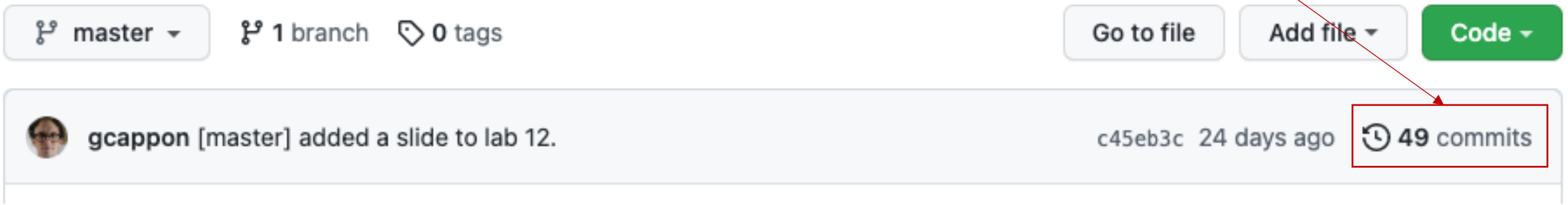
- First, make sure your repository is public. This is true if, in GitHub, a "public" label is present near your repo name:

- If, instead, the label says "private", follow these steps to make it public:
  - Go to "Settings"
  - Scroll down till the "Danger Zone"
  - Click on "Change visibility"
  - Select "Make public"
  - Type the name of the repo to confirm
  - Click on the button

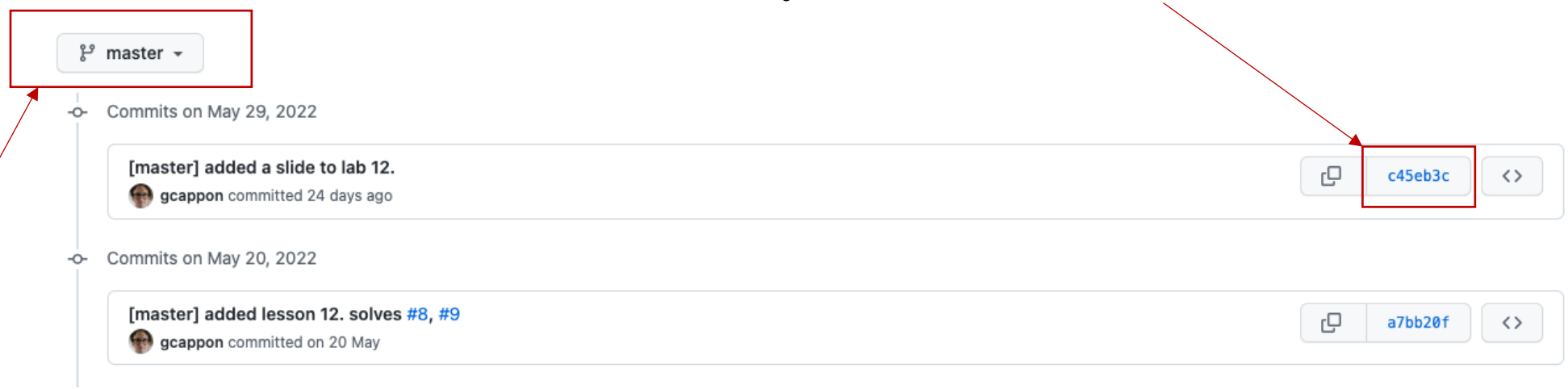


Step 3: Locate the link to a valid code version

- From the home page of your GitHub repo, click on the “history” link



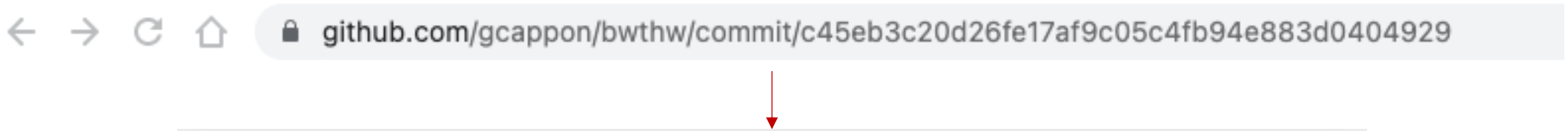
- Click on the link of the version of the code that you want to submit



- Note: be sure that your are in the master (or main) branch!

Step 4: Put the link in the .docx file

- Copy and paste the link in the url bar of your browser in the .docx file below the group info, e.g.:



Group 50

Group members:

ID	Name	Mail
1234567	Giacomo Cappon	giacomo.cappon@unipd.it
1234568	Martina Vettoretti	martina.vettoretti@unipd.it
1234569	Luca Cossu	luca.cossu@phd.unipd.it

Link to the GitHub repository:

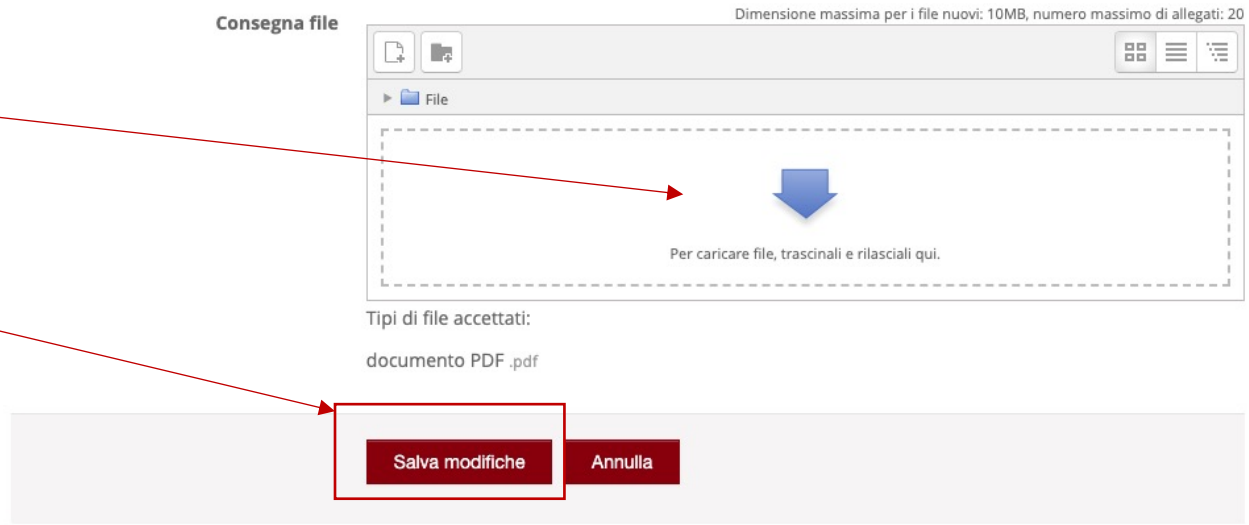
https://github.com/gcappon/bwthw/commit/c45eb3c20d26fe17af9c05c4fb94e883d0404929

Step 5: Submit the .pdf to moodle

- Export your .docx file to .pdf
- Then, go to moodle. In the "Project discussion – Project delivery" section locate "Project delivery":

- Click on the delivery button:

- Upload the .pdf file
- Save and that's it!



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Rationale

- In the following we reported a brief guide that contains some **hints** on what to cover during your project discussion. As such, consider this document as a guide rather than something to “fill” with words and images.

- You are free to use this PowerPoint template (style, colors, etc…) for preparing the presentation. Of course, you are also free to use your own template if you prefer.

- The skeleton proposed here is just a simple guideline. Feel free to change it according to your needs.

Discussion structure – General info

- You have **25 minutes max** to present your project followed by ~20 min of Q&A. Discussions of more than 25 minutes will be penalized.

- The presentation must include a PowerPoint presentation followed by a live demonstration of your app working. Both the presentation and the demo must fit the 25 minutes.

- The discussion has to be in English.

- The Q&A session will be in English.

Discussion structure – (Possible) skeleton

- A possible skeleton for your discussion can be:
  - **Background** - *What's the "story" behind your app? Is it for healthy people? Is it targeting any disease? …*
  - **Problem to be solved/Feature to be provided to the public** - *What's the target user/use case? What kind of problem your app is trying to solve? What's missing in the current market (if some)? …*
  - **Your solution** - *High overview of your app (name, catchy motto, …). What do you want to enable with your app? …*
  - **Core app functionalities**
    - **Screen map of your app**
    - **User authentication and management** - *How do you do it? …*
    - **Data collection** – *How do you do it? …*
    - **Data persistence** – *How do you manage data in your app (DB schema can be used here)? What's the data flow inside your app? …*
    - **Data visualization and presentation** – *How do you visualize user data in your app? …*
  - **Original part** - *What's the original part of your app? Have you implemented literature stuff? If yes, briefly describe it. …*
  - **Project management flavours** - *How did you work as a group? …*
  - **Special implementation decisions** – *Did you make implementative decisions that worth some space in the project discussion? …*
  - **Closing remarks and future developments** – *Sum up you discussion briefly. What are the possible evolution of your app in the future? …*
  - **Live demo** - *Show (via emulator or physical device) your app working.*

Discussion suggestions

- Try to motivate every choice.
- Consider to split the discussion among the group participants to demonstrate that you worked as a group.
- Consider to allocate around 15 minutes for the PowerPoint presentation and 10 minutes for the live demo.
- Prepare the live demo. You only have 10 minutes so you must know what to ”tap”, to show, to do ,….
- Be sure that your app is working when you run the demo.