

REV2023 01–03 March, 2023, Mediterranean Palace Hotel, Thessaloniki, Greece

Work in Progress: A Booking System for Remote Laboratories - The EXPLORE Energy Digital Academy (EEDA) case study

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- The EXPLORE Energy Digital Academy (EEDA) case study
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Motivation

→ Most remote labs:

- ◆ **Don't** accommodate to student's time constraints → wait for an undetermined amount of time until a lab is finally available
- ◆ **Don't** allow exclusive access → simultaneous users interfere with each other
- ◆ **Don't** allow to work in teams → reduces the experimental learning

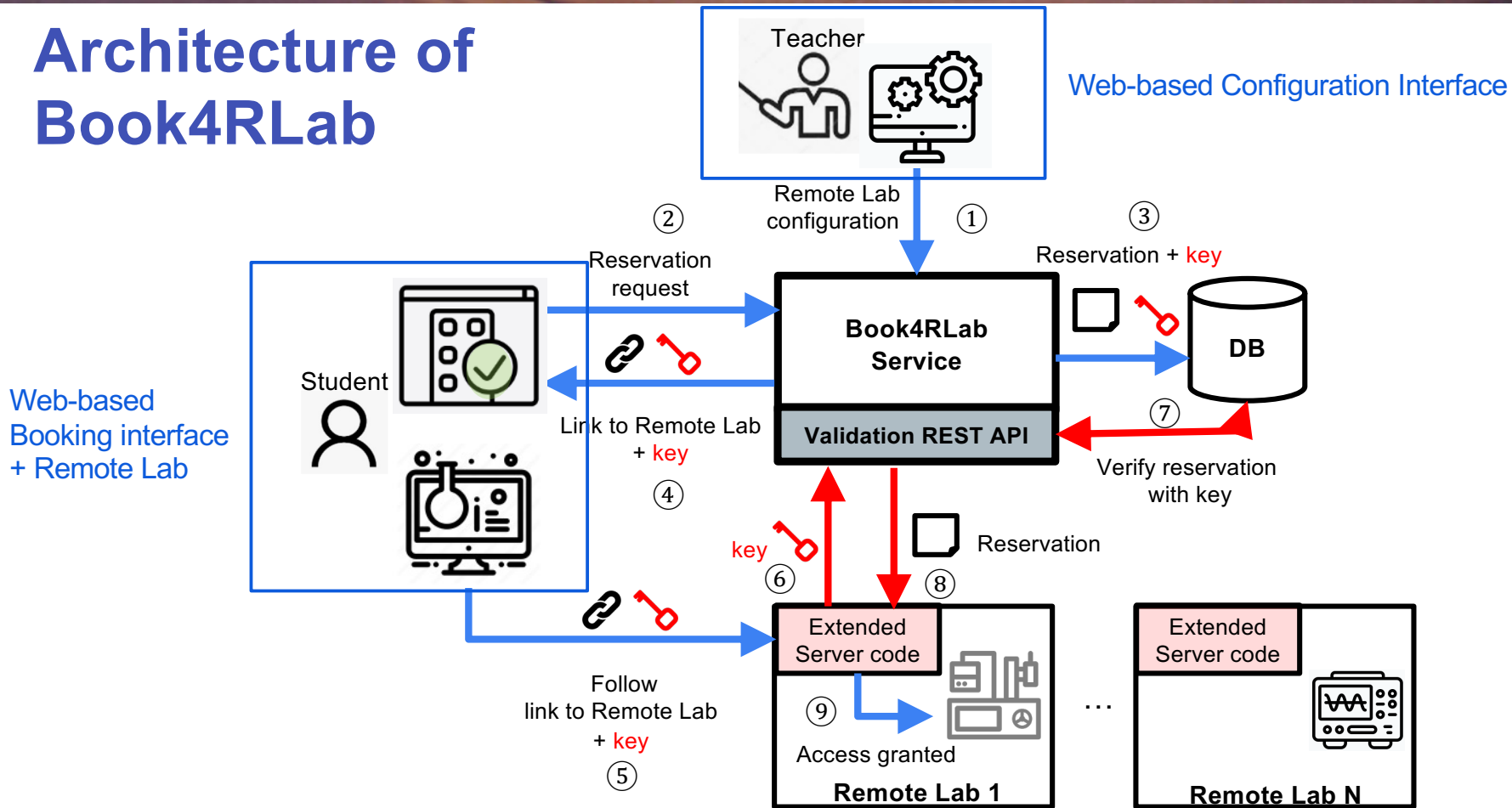
→ Existing booking systems are mostly for **internal institutional use** not for **global collaborative use** with users from different institutions, countries, and time zones.

→ Integrating a Booking System with different Remote Labs may require sharing user/password → security issues!

Overview of Book4RLab

- A new “general purpose” booking system for Remote Labs
- Provides web-based configuration interface for teachers or instructors
- Provides web-based interface for students to book access to different Remote Labs
- Uses a “Zoom-inspired” reservation validation, preventing sharing user/password and enabling private and public sessions
- Provides a Validation Service Application Programming Interface (API)
- Requires only small modification of the server-side of any Remote Lab to be integrated
- Is shared as open-source software

Architecture of Book4RLab



The validation Application Programming Interface (API)

- Book4RLab uses a Zoom-inspired validation system, which differentiates between **public** and **private** reservations.

Join Zoom Meeting

<https://us06web.zoom.us/j/89684057558>

?pwd=a3JSQnBJTWV2YmZmQzIHU3I1

NkVydZ0

https://remotelab.org/access?access_key=xxxxx&pwd=yyyyy

RemoteLab URL

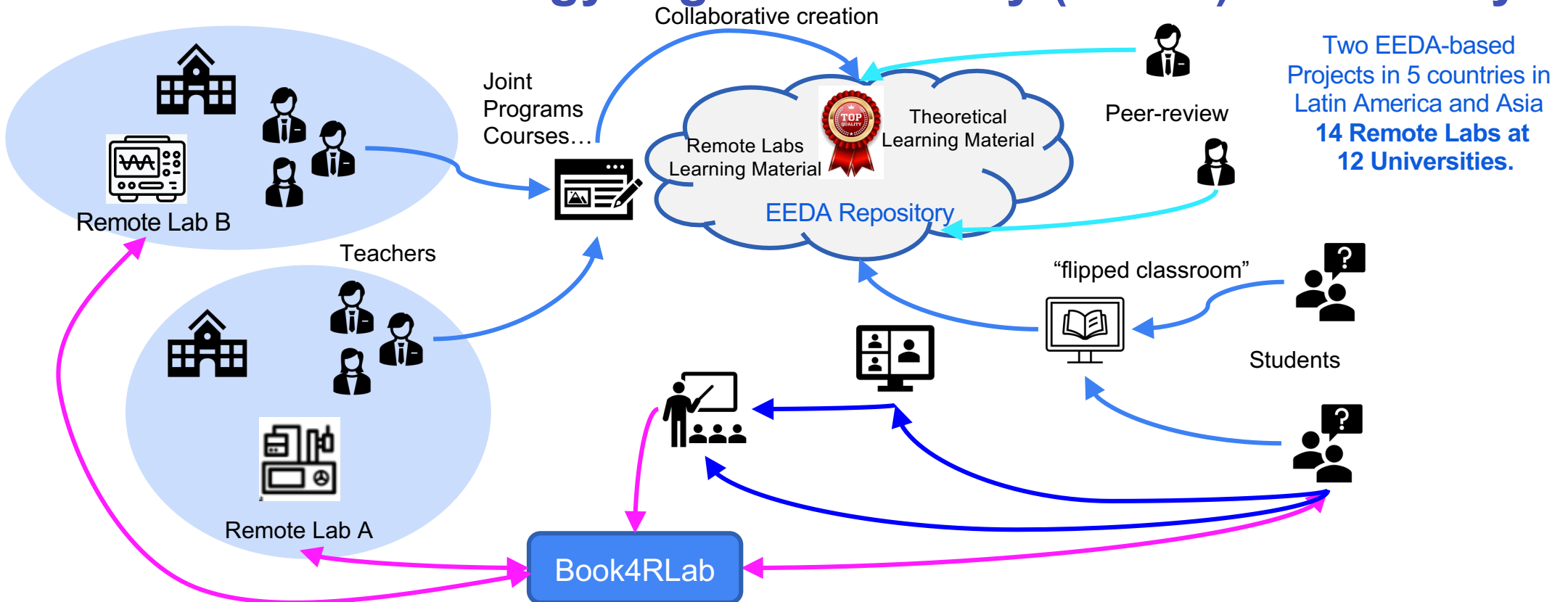
UUID

Password
(for private)

- To validate the reservation the Remote Lab extended server code should read the *access_key* and *pwd* values, and send them to the Book4RLab Validation Service.

EntryPoint	<code>https://book4rlab.org/reservation/</code>
HTTP Method	<code>GET</code>
HTTP Header	<code>content-type: application/json</code> <code>accept: application/json</code>
Body	<code>{}</code>
Query string	<code>access_key=xxxxx&pwd=yyyyy</code>

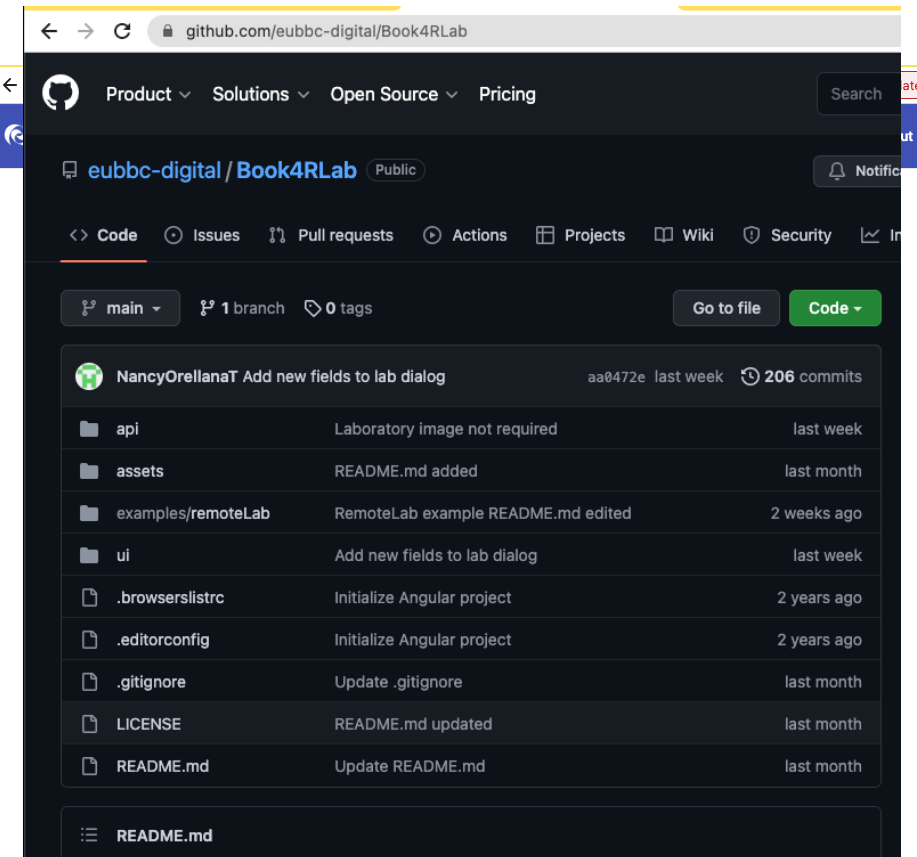
The EXPLORE Energy Digital Academy (EEDA) case study



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Results

- An EEDA Remote Lab (Low-cost Spectrometry Remote Lab) was tested with students from 3 cities, using private and public experiments.
- Low-cost Spectrometry Remote Lab was integrated with Book4RLab in **only 5 lines of python code.**
- **Open source in GitHub**
<https://github.com/eubbc-digital/Book4RLab>
- Includes integration examples for Python, Javascript, NodeJS, bash, Powershell
- Currently integrating 3 other EEDA Remote Labs from Universities in Sri Lanka.



Conclusions

- Book4RLab is a **generic booking system** that does not share user info.
- Zoom-inspired validation mechanism to guarantee exclusive access (and security)
- Students can use Book4RLab to book time slots that best suit their needs.
- Integration of existing Remote Lab is simple requiring few lines of code.
- Book4RLab tested with an EEDA-based Remote Laboratories.
- Open source software on GitHub
- We plan to integrate 14 Remote Labs into this centralized booking system.

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THANK YOU
Q&A