

Updating LabRAD: Remote Experiment Control Software

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The introduction of native asynchrony to Python 3.5+ left room for improvement in LabRAD's Python library. My work on LabRAD this summer focused on this upgrade.

History of LabRAD

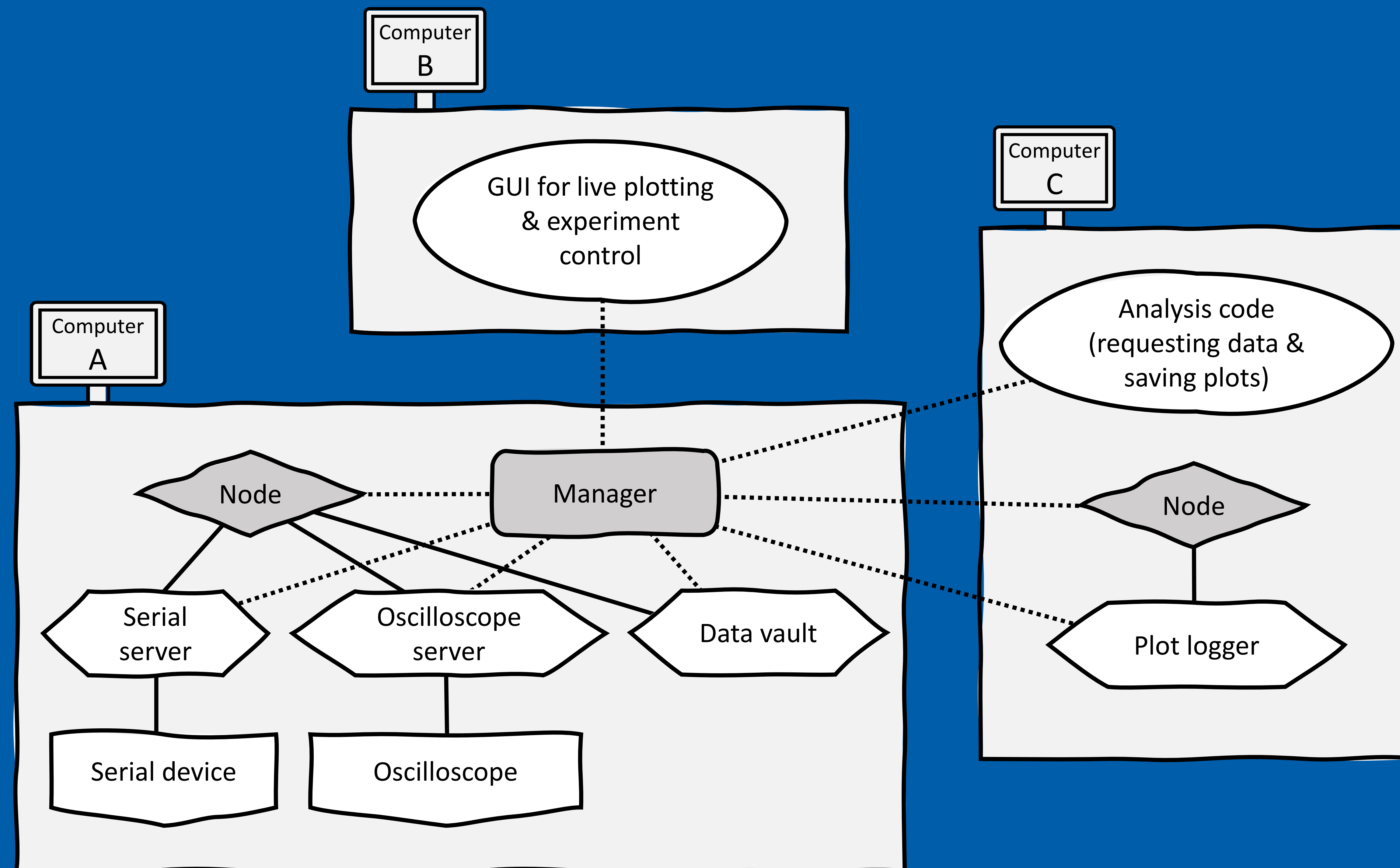
- LabRAD has been in use for over ten years.
- Largely written by the Martinis Group at UCSB.
- Like all software, it needs maintenance to stay up-to-date.

Why LabRAD?

- Existing solutions like LabVIEW have problems.
 - Code often ends up being monolithic—parts of the system cannot be stopped without stopping everything.
 - Code isn't text-based—version control software like git becomes difficult to use.
- LabRAD is **modular**. It allows you to avoid code duplication by breaking your code base into small, independent modules ("servers") that talk over the network. It permits stopping and starting individual servers freely and remotely.
- Write servers in **Python**. Use any Python libraries you want. Pre-written servers are available for many tasks, like saving data and controlling GPIB devices.
- **Networked**. Connect different hardware to different computers. Monitor your experiments and control hardware remotely.

LabRAD is open source

software for writing modular and organized control code.



Future work with LabRAD

- I am in contact with LabRAD's lead maintainer to get my changes incorporated upstream, available for all groups to use.
- Our lab has ordered new hardware to upgrade our ability to perform long pulse sequences. I will be incorporating this new hardware's own control system into our existing LabRAD setup. Having good knowledge of LabRAD will be very helpful here, as we want to achieve feature parity between our current servers and our upcoming ones in order to make the transition seamless.

Other work this summer

- COVID prevented planned summer project doing RaOCH_3^+ spectroscopy.
- Alongside working remotely on LabRAD, I made a variety of code contributions to our lab's repositories. These are too diverse to enumerate here, but please ask if you are curious.

Acknowledgements

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