Debugging

- General Debugging
- VSCode Shortcuts and Extensions
- Python Debugging

General Debugging

Understand the System

- **Read the documentation** from cover-to-cover to understand how to get the results you want
  - Go in depth on things applicable at the moment
- **Know your roadmap**
  - Understand what is black box and what is not
- **Understand your debugging tools**
  - What tools do you have in order to solve the issue? Learn them in detail.
  - Do debug logs exist?

Make it Fail

- Do it again so you can look at it, focus on the cause, and know when it is fixed
- Start at the beginning, at a known state that is reliable.
- Simulate the conditions that stimulate the failure.
  - Its fine to recreate the environment of failure to an extent, but at some point the failing system may not be identical to the recreated environment.
- Record everything and find the signature of intermittent bugs

Quit Thinking and Look

- Looking is hard, in Software Code it means put in breakpoints, add debug statements, monitoring program values, and examining memory. In Data, it means look at the data manually
- Guess only to narrow the search, but always look to make sure that is indeed the issue
- Build tools to insure that it is fixed

Divide and Conquer

- Narrow the search with successive approximation.
- Determine which side the bug is on
- Use easy-to-spot test patterns
- Start with the bad/bug and go backwards

Change One Thing at a Time

- Isolate the key factor
- Change one test at a time and remember to revert back to the state if the change did not fix

- Compare with a good one
- Determine what you changed since the last time it worked properly

Keep and Audit Trail

- Document what you did, in what order, and what happened as a result
- Any detail could be an important one
- Correlate events.
  - "It made noise for four seconds starting at 21:04:53" is better than "it made noise"

Check the Plug

- Question your assumptions
  - Are you running the latest code?
- Start at the Beginning
  - Is it plugged in to power? Is power working to begin with?
  - Is the correct input going through?
- Test the Tool
  - Does it work on others?

Get a Fresh View

- Ask for fresh insights
  - Coworkers is all around you, and consider tracking down an expert
- Report Symptoms, Not theories
  - See if a colleague can reach same conclusion without telling them your conclusion

If you Didnt Fix it, It Ain't Fixed

- Check to see if its really fixed
- Problems do not go away by itself
- Learn from the fix, and design better in the future

VSCode Shortcuts and Extensions

Python Debugging