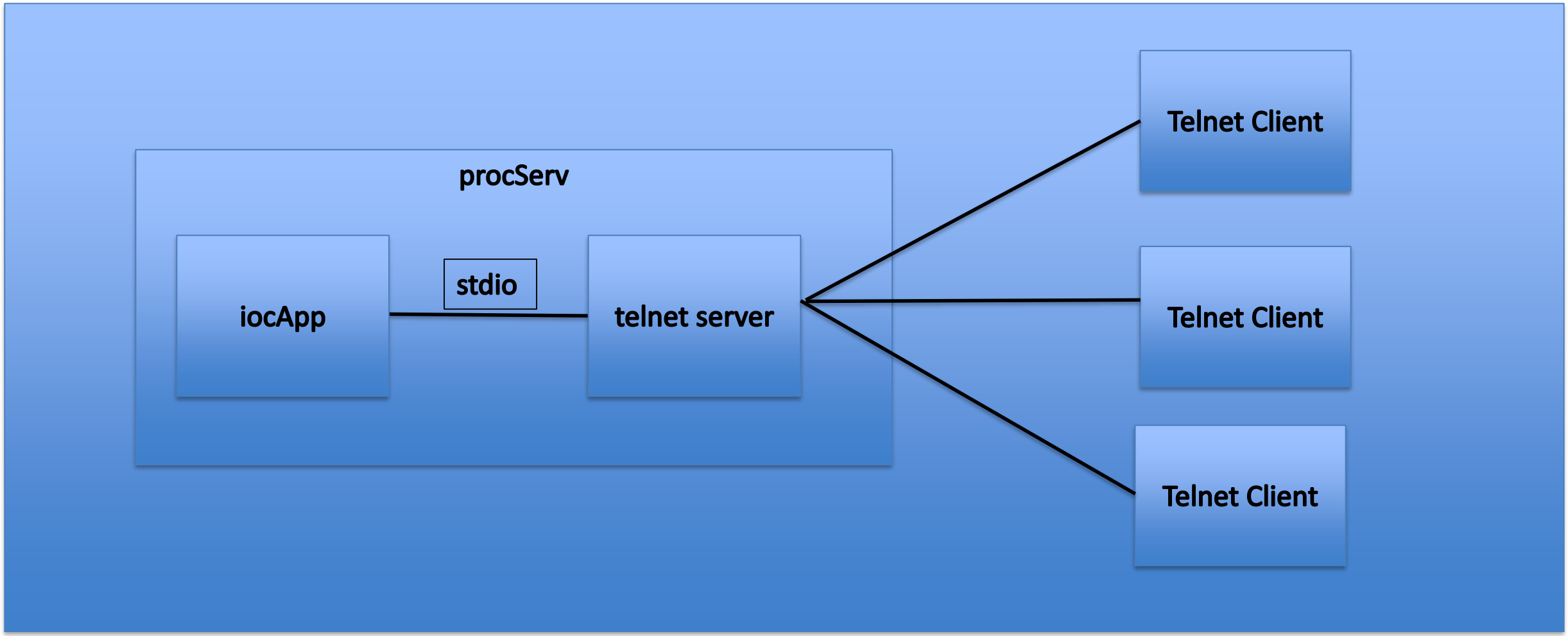
Introduction to pyProcserv

pyProcServ

- Python-based
- Platform-Independent
- Plug-in replacement for existing procServ

procServ (Recap)



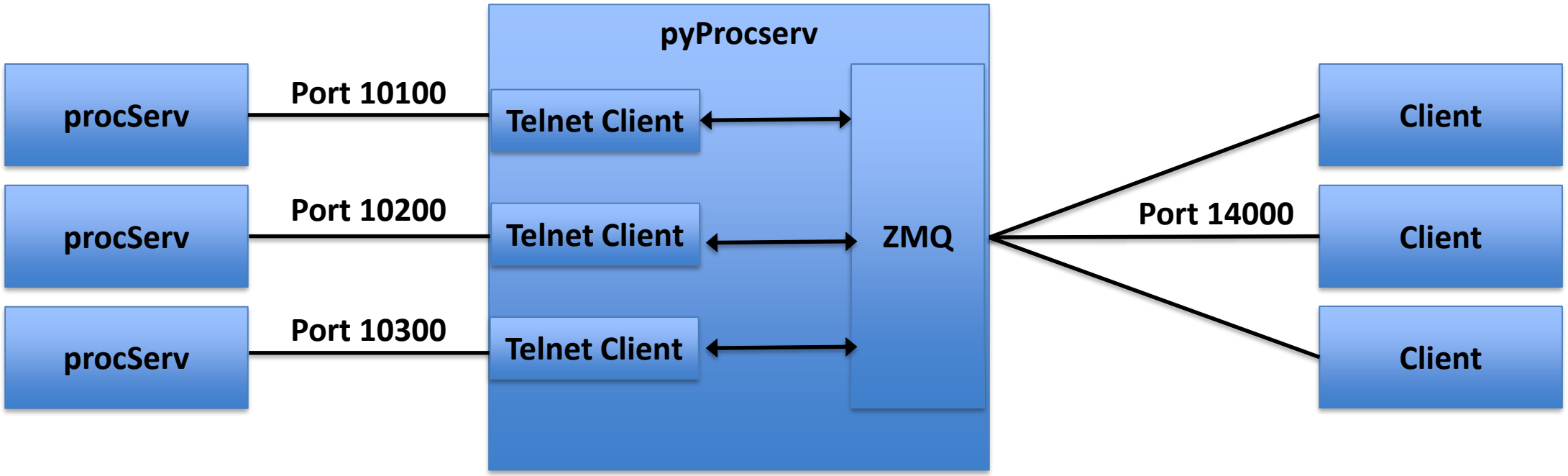
Opportunities

- Auto-discover (respond to broadcasts)
- Broadcast server presence (beacons)
- Authentication
- Different protocols
  - SSH
  - SSL/TLS
  - Websockets (a la Jupyterlab/Terminado)

Opportunities

- procServ “concentrator”
  - Task to watch for existing procServ installations
  - Connect to them via a telnet client
  - Serve those through a single port via ZMQ or other means
  - High-level menu:
    - Allow client to select one or more procServs
    - Dynamically add/delete subprocesses to serve (remotely)

procServ Concentrator

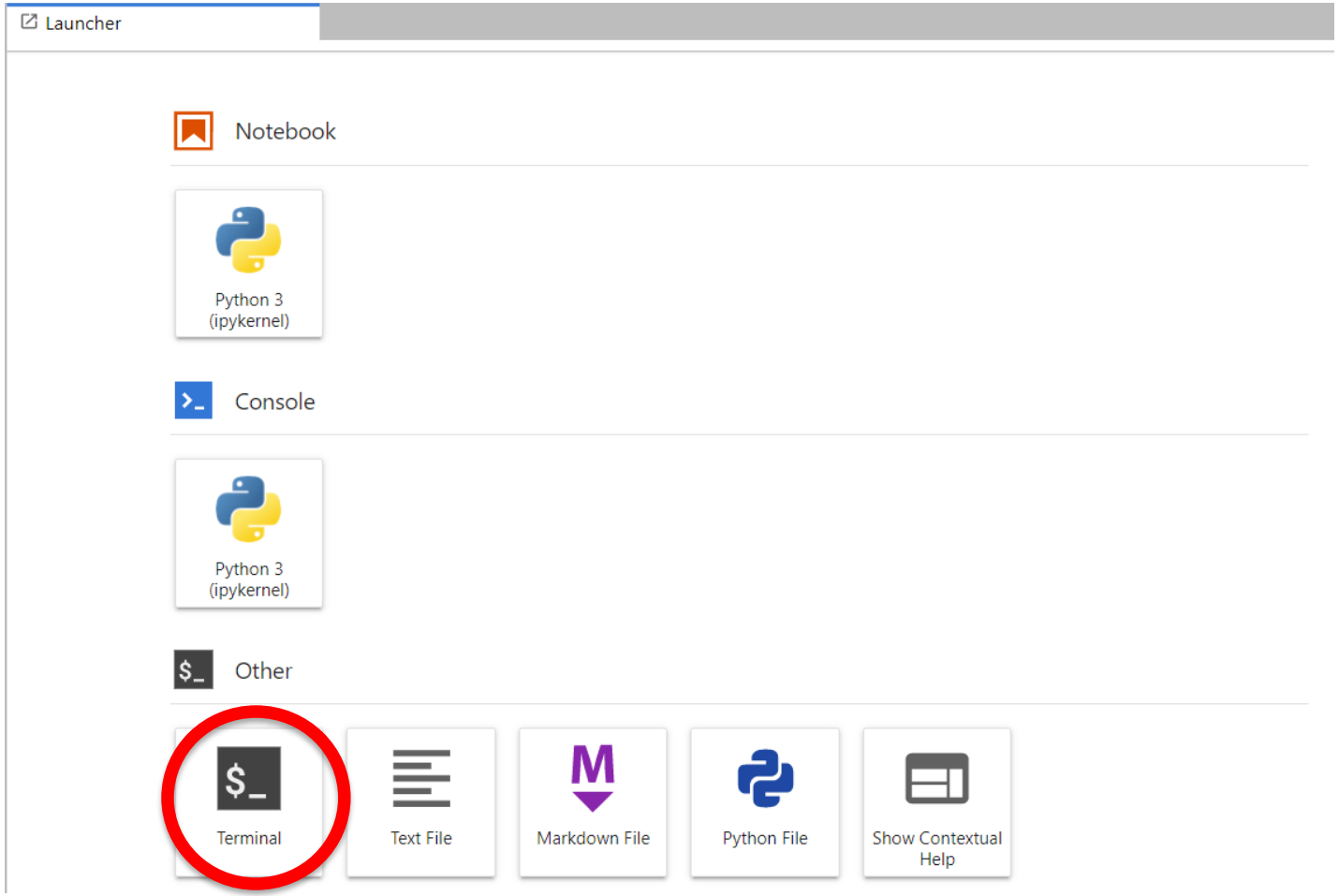


Status of ~~Introduction to~~ pyProcserv

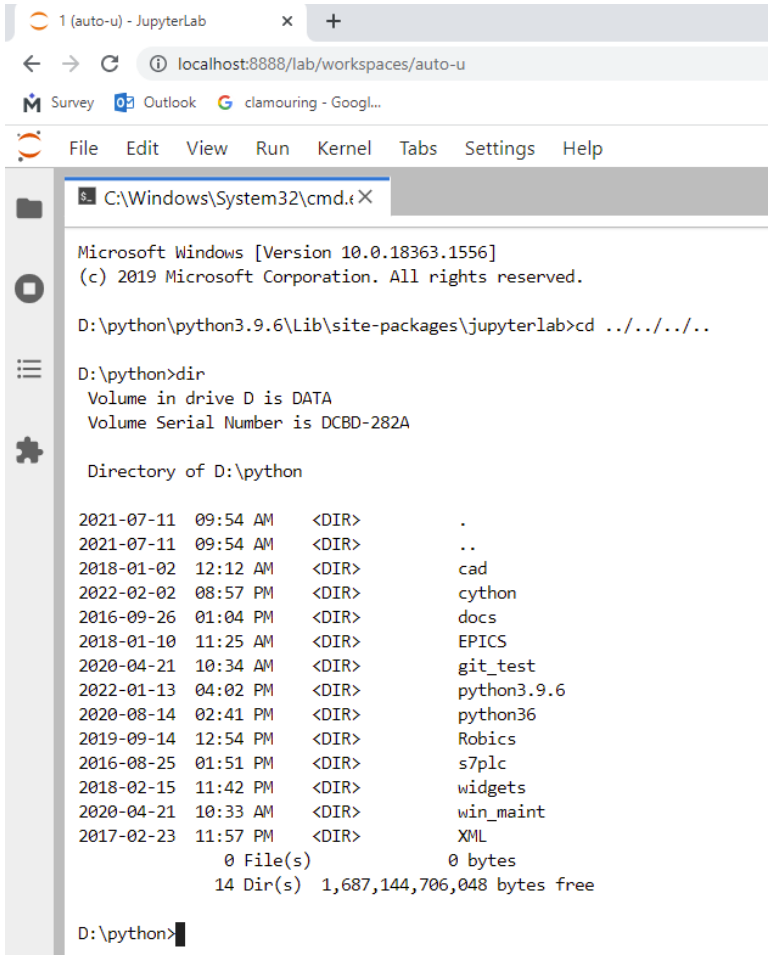
Jupyter/Terminado

- Terminado does exactly what I want (and more) over websockets.
  - Uses Tornado/Asyncio (Server)
    - The Tornado 6.0 event loop is now a wrapper around asyncio's
  - Xterm.js (client)
  - Seemed a good fit

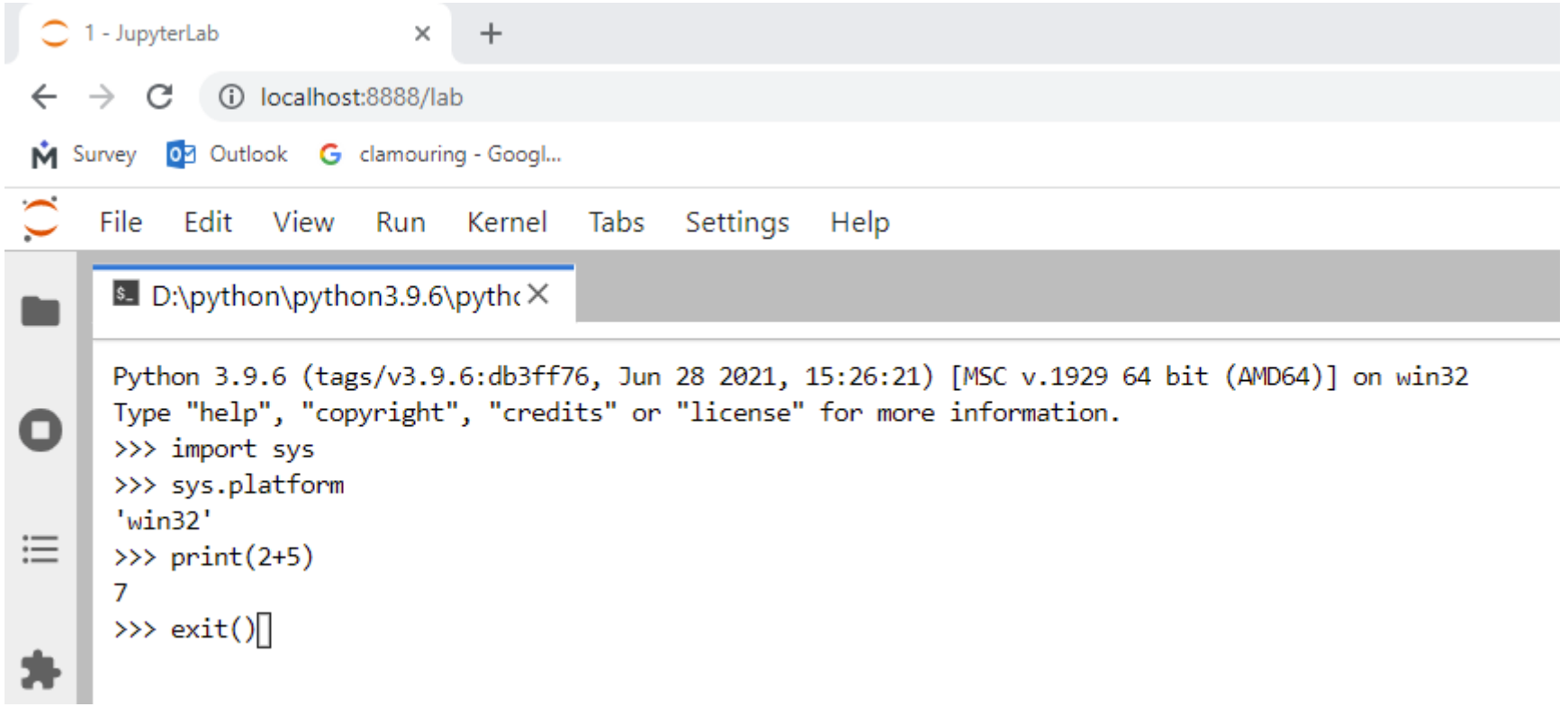
Jupyter/Terminado (Main Screen)



Jupyter/Terminado (Win Terminal)



Jupyter/Terminado (Python Console)



Jupyter/Terminado (iocApp Console)

C:\WINDOWS\system32\cmc

```
## Register all support components, I say
dbLoadDatabase "./dbd/sr_ioc.dbd"
sr_ioc_registerRecordDeviceDriver pdbbase
Warning: IOC is booting with TOP = "D:/sandbox/2021_EPICS_Collaboration_Meeting/presentations/Tanner/demos/testIoc"
         but was built with TOP = "D:/sandbox/AARMS/AARMS_save_restore_local_delete_after_deploy/testIoc"
## Load record instances
dbLoadRecords("./db/sr_test.db", "user=tannerr")
iocInit
Starting iocInit
############################################################################
## EPICS R3.14.12.8
## EPICS Base built Apr 24 2020
############################################################################
cas warning: Configured TCP port was unavailable.
cas warning: Using dynamically assigned TCP port 52635,
cas warning: but now two or more servers share the same UDP port.
cas warning: Depending on your IP kernel this server may not be
cas warning: reachable with UDP unicast (a host's IP in EPICS_CA_ADDR_LIST)
iocRun: All initialization complete
dbpf ioc:app:start "2022-09-13 14:40:12.65"
DBR_STRING:          "2022-09-13 14:40:12.65"
AARMS_IOC_SIM >
```

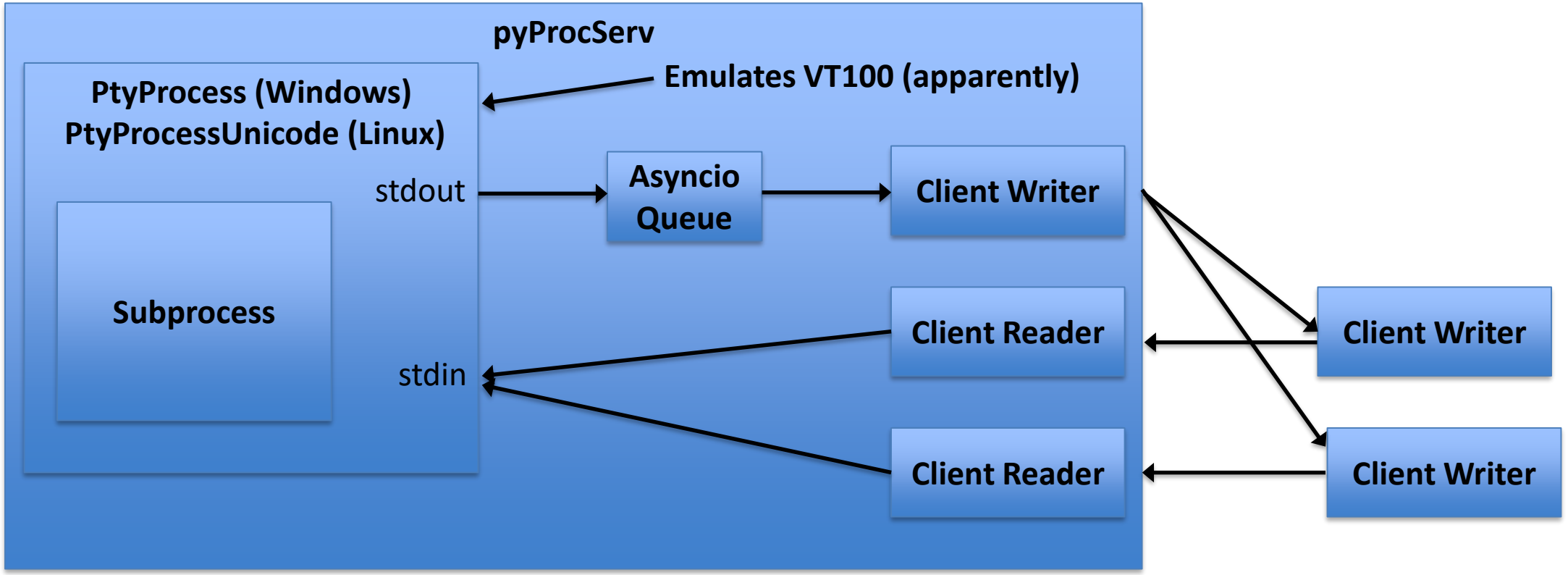
pyProcServ

- Multiple options for wrapping a subprocess in Python:
  - subprocess
  - multiprocessing
  - pywinpty
  - Asyncio subprocess functions
- …as well as for networking
  - socketserver
  - asyncio
  - Telnetlib3 (asyncio-compatible)

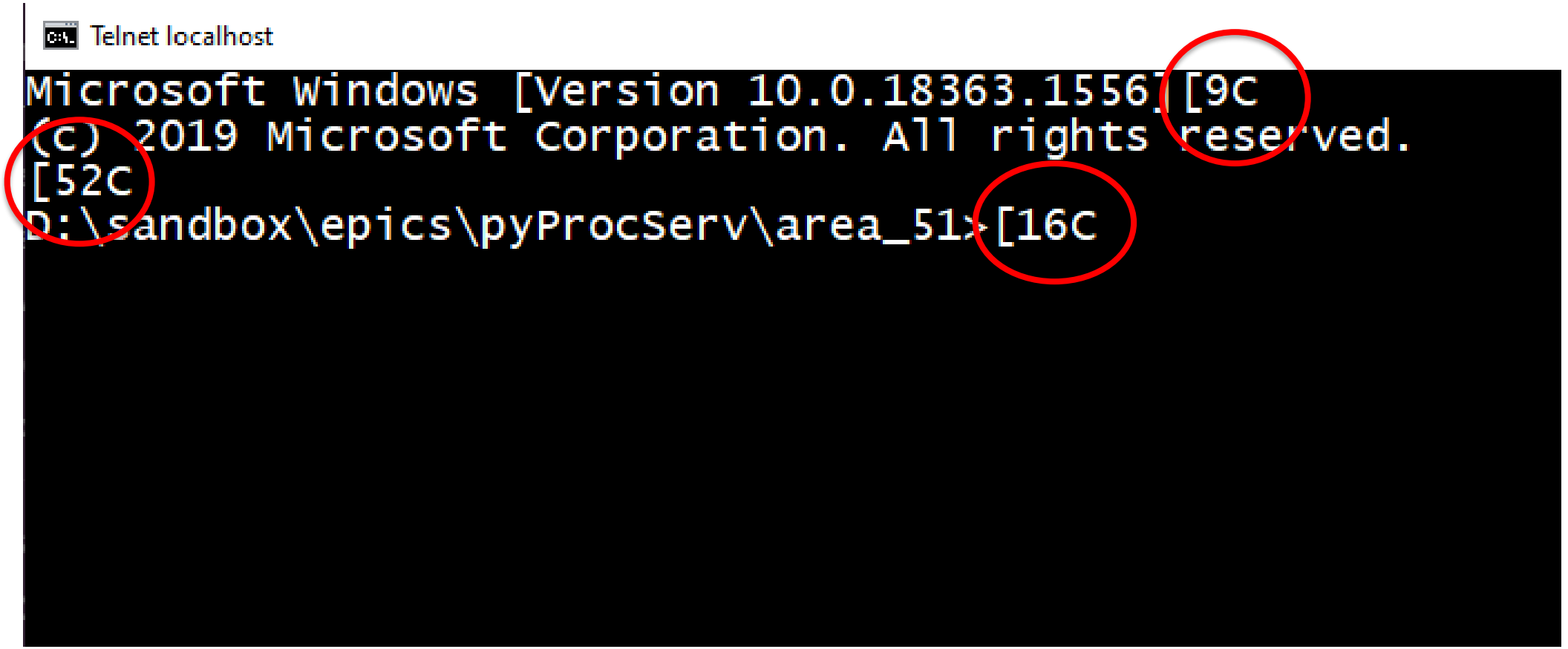
Asyncio

- Concurrency in a single thread
- Cooperative
- Used by PythonIOC
- Used by Terminado (Tornado loop v6 wraps asyncio loop)
- Telnetlib3 uses asyncio
- Great separation between transport and protocol
- There is an asyncSSH module

Basic Layout



Telnet Output (Sockets)



Telnet Output (Socket)

```
Microsoft Windows [Version 10.0.18363.1556][9C
(c) 2019 Microsoft Corporation. All rights reserved.
[52C
D:\sandbox\epics\pyProcServ\area_51>[16C
didrir

 Volume in drive D is DATA[35C
 Volume Serial Number is DCBD-282A[27C
[61C
 Directory of D:\sandbox\epics\pyProcServ\area_51[12C
[61C
2022-09-13  04:13 PM    <DIR>          .[21C
2022-09-13  04:13 PM    <DIR>          ..[20C
2022-09-13  11:51 AM            10,091 pass_through.py[26C
2022-08-30  07:24 PM            22,964 testing_telnet.py[24C
2022-01-27  08:09 PM            11,979 test_subprocess.py[23C
2022-01-13  08:52 PM             2,498 web_term.py[30C
2022-08-10  05:12 PM             4,538 winpsuedoterm.py[25C
2022-08-15  10:07 AM    <DIR>          __pycache__[30C
              36 File(s)        211,074 bytes[35C
               4 Dir(s)  1,687,143,002,112 bytes free[27C
0;C:\Windows\System32\cmd.exe
                       D:\sandbox\epics\pyProcServ\area_51>[44C
```

Telnet Output (Telnetlib3)

- Using telnetlib3
- Same output
- Noticed a lot more going back and forth (IAC) 0xFF

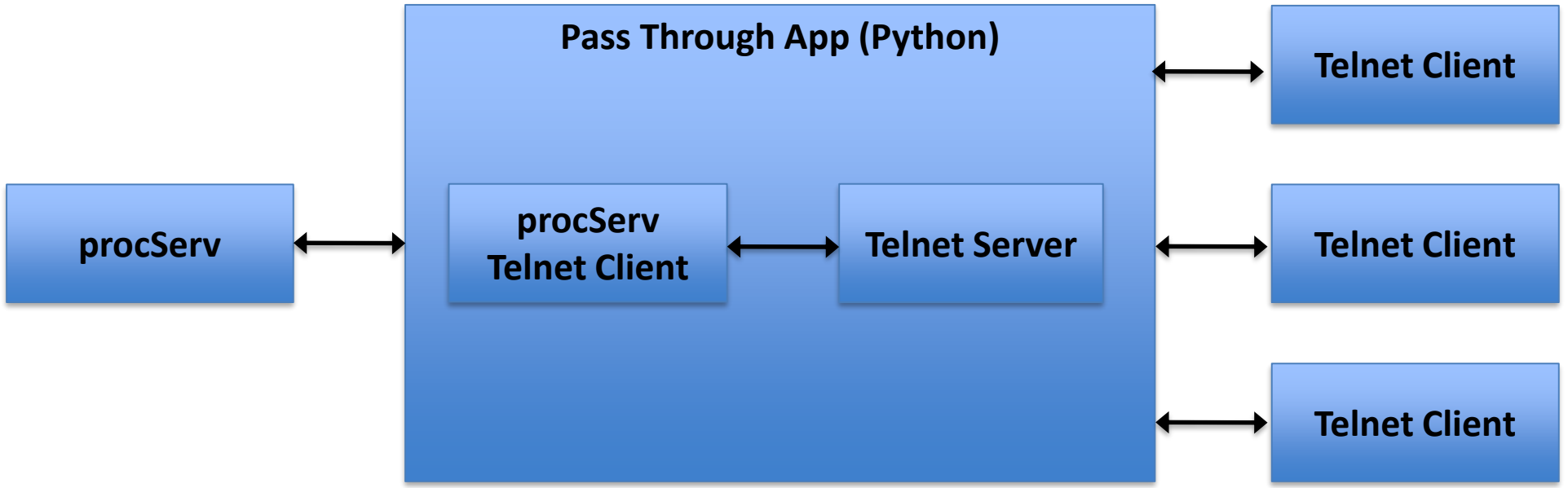
Under the Hood

x1b[?25lMicrosoft Windows [Version 10.0.18363.1556]
\x1b[9X\x1b[9C\r\n

(c) 2019 Microsoft Corporation. All rights reserved.\r\n
\x1b[52X\x1b[52C\r\n

D:\\sandbox\\epics\\pyProcServ\\area_51>\x1b[16X\x1b[16C\x1b[4;37H\x1b[?25h

Pass-Through Test



Conclusion

- Any help GREATLY appreciated
  - Further reading
  - Links
  - Other resources
  - Guidance
- All is not lost:
  - Concentrator proof-of-concept