3. OPC UA and DA in LabVIEW, LabVIEW Classes

OPC - Open Platform Communications [Wikipedia Article]

Check out Antoines LabVIEW examples in GITLab: [https://gitlab.cern.ch/rade/roots/OPC-demo](https://gitlab.cern.ch/rade/roots/OPC-demo)

**OPC DA**
- Check Windows DCOM settings
- DSC module must be installed in LabVIEW
- Go for OPC UA when in doubt and not dealing with 'legacy systems'
- When creating an I/O item in LabVIEW: **Check the I/O Server Update Rate!**
- I/O server acts as bridge between OPC DA and LabVIEW shared variable engine
- Access via
  - Shared Variable nodes
  - Programmatic access Shared Variable open read/write close vis
  - Data Socket open read/write close vis (also in Linux)
- Matrikon OPC Server (TODO: link?) Create processes and values (tags)
- Right click Shared Variable nodes, show Timeout and Timestamp
- Can be difficult to debug (Use NI Distributed System Manager, restart Shared Variable Engine process in Windows)

**OPC UA**
- Industry standard
- Linux/Windows
- OPC UA Server LabVIEW VIs are installed with the DSC module
- A LabVIEW Application Instance is then running the the OPC UA Server
- Need to create SSL certificates using the appropriate VIs
- Have to somehow distribute the certificate to clients to enable them to connect
- High throughput possible: 80-90% of the network
- HTTPS connection should work to connect to OPC UA Server
- TLS encryption library is not natively supported in LabVIEW
- Guru contact at CERN: [Benjamin Farnham](mailto:BE-ICS-CIC)
- Options for LabVIEW 1:1 communication
  (complemented by the AMQP middleware)

Classes:
- Optimized data copying (no big clusters)
- Similar to library with private-scope virtual folder
- Data encapsulation, data scope, protected data access
- Code Reuse
- Run-Time Polymorphism through dynamic dispatch
- Member access possible through property nodes
  **Careful:** Use of property nodes forces GUI into memory

Need to build up classification experience and architecture knowledge:
**If you have some classes and a rough architecture, run it by your colleagues and discuss pros/cons!**

Move from Code Review to Peer implementation to help each other out.

**Team Exercises:**
Build a class-based API/library
Build a class-based Application architecture

Upcoming event:
A classy BnP Afternoon! - Tuesday, 11th of July 16:00 to 19:00
3x3 Teams to create an architecture for a library and an application