EOS Windows client productisation

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The Journey of EOS productisation at Comtrade 360

Comtrade 360 at CERN openlab
Provide EOS for Windows clients
Presentation of EOS in a Windows way
Upgrades of CERN EOS
CERN EOS productisation
Directions of current and future work
Comtrade 360 at CERN openlab

Journey of Comtrade 360 through the CERN

1. CERN openlab – Comtrade – Comtrade 360
2. Needs and characteristics of CERN EOS
3. EOS implementation
4. EOS productisation by Comtrade 360
1. CERN openlab – Comtrade – Comtrade 360

Comtrade: 30 years of enterprise software development
7 years at CERN

• 1992: Comtrade
  A valuable business partner in an enterprise-level backup product development

• 2015: Comtrade
  Signed CERN openlab Project Agreement for EOS Productisation

• 2016: Comtrade
  Full installation kit for CERN EOS

• 2018: Comtrade
  CERN EOS User Manual

• 2022: Comtrade 360
  Provide EOS for Windows clients (EOS-wnc)

CERN EOS workshop 2022
2. Needs and characteristics of EOS

What was the initial aim of EOS?

• Collecting data generated by sensors
• Allowing physicists insight into experiments at CERN
• Ability of a huge data inflow
• Secure data storage
• Extremely low latency
• Provide “unlimited” storage size extensions
3. EOS implementation

EOS: Software developed at CERN

- EOS fulfils the extreme requirements of CERN experiments
- EOS fulfils high-reliability (RAID-DP, RAID 6, Archive)
- EOS storage capabilities (set-up at CERN in 2022)
  - Storage volume: 500 PB
  - Number of hard disks: 40,000
  - Number of files: 7,000,000,000
  - Number of clients: 30,000
4. EOS productisation by Comtrade 360

Productisation of EOS at CERN in 2022

- **EOS-wnc** (EOS Windows native client)
- EOS-wnc maintenance
- Appropriate documentation for EOS-wnc (open)
- EOS-wnc to meet industry requirements for the installation process
- EOS-wnc to meet industry requirements for support
Provide EOS for Windows clients

5. Disk access on Windows
6. Communication to EOS cluster
7. Interface to Windows operating system
5. Disk access on Windows ($c_1$)

The technology used for Windows disk access

- Using Microsoft Visual Studio and Windows native APIs
- The fastest Windows-native low-level libraries
- No additional Linux-like functions
- No additional interface for EOS-wnc console to Windows disks
6. Communication to EOS cluster ($c_2$)

EOS client communication with EOS cluster

- cURL (HTTPS) for file transfers
- gRPC (HTTPS) for command calls
- Active Directory (used for EOS-drive)
7. Interface to Windows operating system ($c_3$)

EOS Windows client should be Windows native

- The same user experience
  - EOS client on Linux and EOS client on Windows
    - EOS commands
    - EOS console
- Improvements to EOS console on Windows
  - History
  - Search
  - Help
Presentation of EOS in a Windows way

8. EOS drive using Dokan
9. EOS drive and Dokan 2
8. EOS drive using Dokan (c₄)

EOS cluster is presented as Windows drive letter

- EOS as Windows drive
- EOS cluster access with Dokan
  - Virtual file system
- Avoid Windows Kernel programming by using Dokan driver
  - Avoiding of possible high-cost issues (bugs)
- Dokan: High-performance thin driver
9. EOS drive and Dokan v2

Continuous improvement of EOS drive

• Implementation of Dokan v2
  • New version of Dokan – first release 2021-12-31
• Re-implementation of cURL
  • Some additional requirements related to Dokan v2
• Dokan v2 advantages
  • Sequential request: 10-35 % faster related to Dokan v1
  • File search: 100-200 % faster related to Dokan v1
Upgrades of CERN EOS

10. Assurance of performance
11. Continuous testing in CERN on EOS-PPS
10. Assurance of performance

High performance – important EOS feature

• Performance testing environment at Comtrade
  • Allows local continuous performance testing
• Performance aware development
  • Performance testing for each newly added feature
• EOS commands implementation for EOS-wnc
  • Performance comparison with EOS commands on Linux
11. Continuous testing in CERN on EOS-PPS

Continuous testing on the testing cluster at CERN (EOS-PPS)

- Joined development
  - CERN openlab : Comtrade 360
- Special thanks to Luca Mascetti and Manuel Reis
  - Continuous performance testing at CERN by Manuel Reis
- Immediate warning according to possible performance issue
  - Immediate actions: check new code to improve performance
CERN EOS productisation

12. Documentation of EOS-wnc
13. Business model for EOS-wnc (supporting)
14. Business model for EOS-wnc (selling)
15. Comparison: EOS and other DFS
12. Documentation of EOS-wnc

Professional software needs professional documentation

• Documentation for the EOS system
  • Installation of EOS
  • Documentation of EOS commands
  • Setting up EOS cluster
  • Need to update according to current EOS version
• Documentation for EOS-wnc
  • Windows help for EOS-wnc commands
  • Documentation as a manual – need to provide
13. Business model for EOS-wnc (supporting)

How to support EOS-wnc

- EOS cluster is open source
  - Available open-source support
- EOS-wnc is planned as proprietary software
  - Freely available for CERN
  - Need to provide support as bug fixing
  - Need to provide support as upgrades to new Windows OS
14. Business model for EOS-wnc (selling)

How to sell EOS-wnc

- Selling open-source (EOS cluster)
  - Installation and set-up
  - Open-source support
- Selling proprietary software (EOS-wnc)
  - Selling new versions of EOS-wnc
- Convince customers
  - EOS is the most adequate solution
15. Comparison between EOS and other Distributed File Systems

Most DFS (Distributed File Systems) are the “best”

- Current action at Comtrade 360
- Comparison between following DFS:
  - CephFS
  - Hadoop
  - Lustre
  - CERN EOS
- Setting up DFS performance testing environment
- Planned
  - Consult with CERN about EOS performance testing
Directions of current and future work

Productisation of EOS & Productisation of EOS-wnc

To finalise:
- Missing commands
- Upgrade to Dokan v2
- Comparison testing
- Documentation
- Business model

Additional actions:
- Professional testing
- Marketing plan
- Support plan
Discussion: How to improve EOS-wnc productisation?
Thank you

Gratitude

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