VMS Software

What’s new… or in progress?

March 2022

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Agenda

- Introduction
- Some recent product updates
- In progress
- New solutions
- Summary
- Questions

Introduction

- Obviously we're working on the OpenVMS x86-64 port
- And that's the top priority

- However we are also working on a number of other things...
  - New products
  - New versions of and enhancements to existing products
  - Services offerings
  - New solutions (products with associated services)
  - ...

OpenVMS instances in the cloud

On-premise OpenVMS servers

OpenVMS powered edge computers

"From the field to the cloud"

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Some recent product updates

- ACME-LDAP
- CivetWeb
- CSWS (Apache HTTPD)
- cURL
- IDE
- Kerberos (fixed day-1 bug)
- librdkafka
- Lua
- OpenLDAP
- OpenSSL
- Python
- Samba
- SQL Relay
- SWIG
- TPware (ACMS integration)
- vgit
- WebUI
- WSIT

Most of these updates represent new versions of open source products; however there have also been a number of interesting non-open source product enhancements, and one or two bug-fixes. Many products have also been ported to x86-64.

SQL Relay

The Oracle announcement…

October, 2020

Dear Oracle Database 11g on OpenVMS Customers,

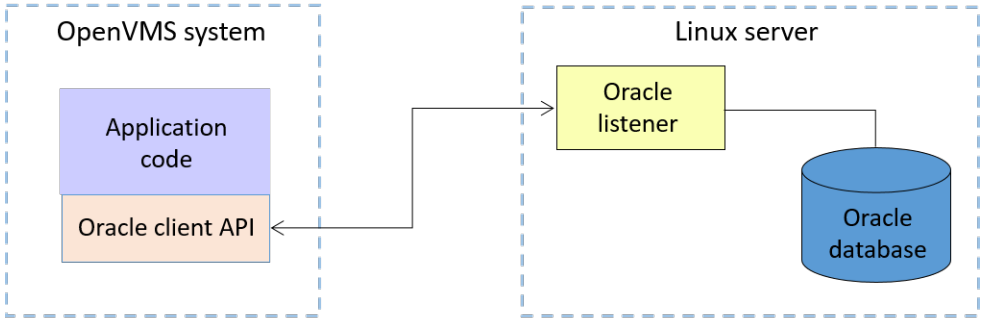
We are writing to inform you that Oracle Database 11.2.0.4 will be the terminal Oracle Database release offered on the OpenVMS platform. MOS DOC ID 742060.1 has recently been updated to reflect this development.

Oracle 11.2.0.4 is currently in Extended Support (ES) until December 31, 2020 and there is an ES fee waiver in place until that time as described in Oracle Software Technical Support Policies: (see http://www.oracle.com/us/support/library/057419.pdf).

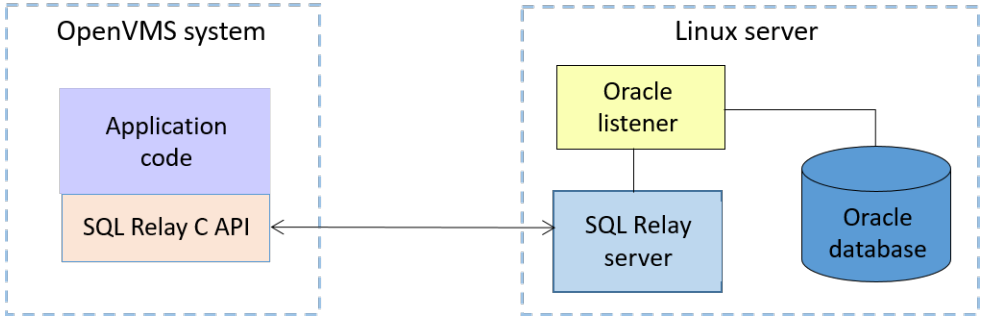
These changes only apply to Oracle Database on OpenVMS; the Oracle Rdb database product release and support plans are not affected by this announcement.

SQL Relay

- See http://sqlrelay.sourceforge.net/
- Provides database access to unsupported platforms (and does other stuff as well)



Run the Oracle database on another platform (maybe it's already on another platform) and access it from your OpenVMS applications with few if any code changes... just a recompile and link... that's the theory ☺



The database-agnostic SQL Relay client API has been ported to OpenVMS (Alpha and Itanium). This communicates with the SQL Relay server process (Linux or Windows), which can be configured to work with a number of databases, including Oracle.

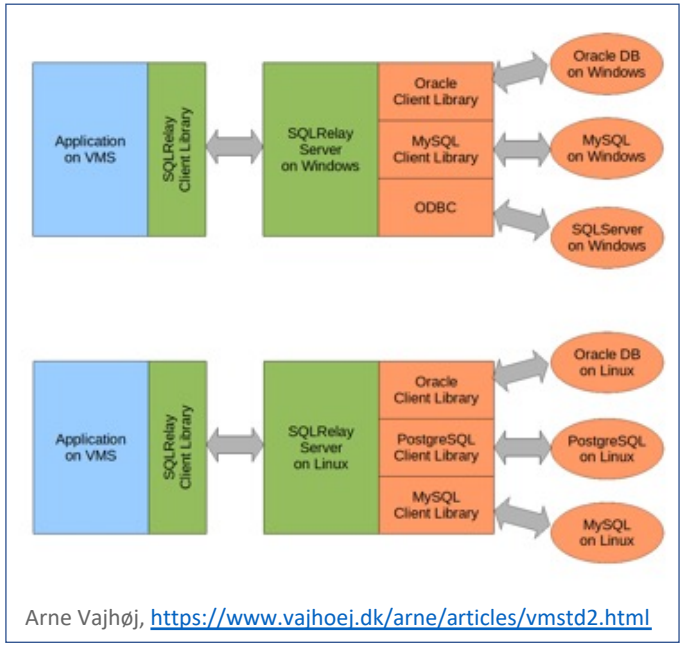
SQL Relay… how does it work?

- Oracle client API on OpenVMS is replaced by the SQL Relay client API
- SQL statements are passed by the SQL Relay client across the network to the SQL Relay server
- The SQL Relay server (on Linux or Windows) interacts with the Oracle database via the Oracle OCI API
- Potentially no code changes required to the OpenVMS application code (in theory)
- SSL/TLS support

- Several command line tools
  - Command line tool similar to Oracle SQL*Plus (limited functionality)
  - Simple database import/export tools

- Some limitations (from an Oracle perspective)
  - Cannot be used if application code uses raw OCI routines
  - No SQL*Loader replacement

- Supports other databases in addition to Oracle
  - DB2, Firebird, Informix, MySQL, ODBC (generic), Oracle, PostgreSQL, Sybase, SQL Server, …



Arne Vajhøj, https://www.vajhoej.dk/arne/articles/vmstd2.html

SQL Relay

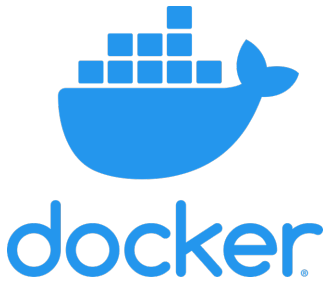
- We've ported the SQL Relay client C/C++ API to VSI OpenVMS
- Implemented OpenVMS-friendly wrapper API
  - Makes it easier to use the SQL Relay client API with languages other than C/C++

- Working on embedded SQL pre-processors (Beta)
  - Now very well-advanced
  - Focussing on C and COBOL first, followed by Fortran
  - May then look at other languages

- Working on JDBC support with OpenJDK (communicates via SQL Relay ODBC bridge)

- Docker container running SQL Relay server and Oracle Instant Client
  - Simplifies deployment
  - Works very well

- And we'll happily provide services to help you move ☺



OpenSSL

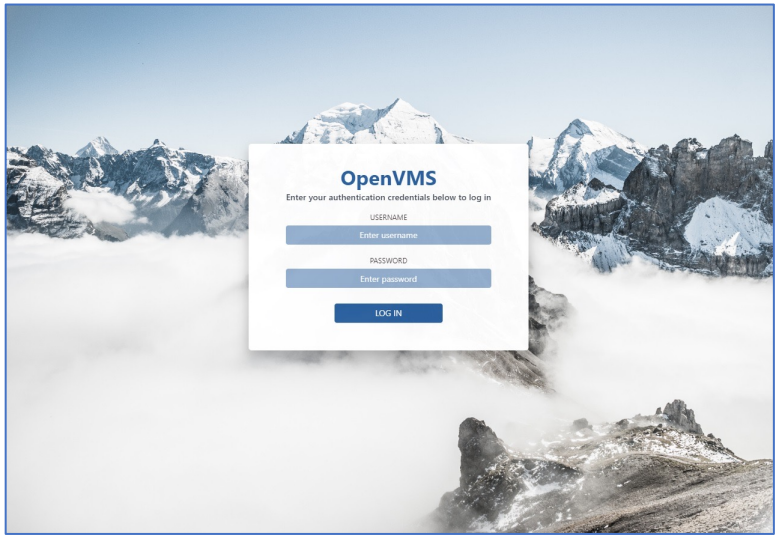
- Aiming to keep up to date with OpenSSL releases (now have a very efficient process)
- Recently released OpenSSL 1.1.1m and OpenSSL 3.0.1
- All platforms
- Older OpenSSL 1.0 and 0.9 version no longer supported
- Working on new entropy engine that will work with OpenSSL 3.0 to help facilitate FIPS 140-x compliance

"VSI are pleased to announce the release of SSL3 for VSI OpenVMS (Alpha, I64, and x86-64). This release of SSL3 for VSI OpenVMS is based on the OpenSSL 3.0.1 distribution. It should be noted that SSL3 for VSI OpenVMS is not intended to replace the existing SSL111 product (based on OpenSSL 1.1.1) and under no circumstances should SSL111 be removed from your VSI OpenVMS systems, as some operating system features, layered products, and open source products depend upon it, and many existing applications that use SSL111 will not be compatible with SSL3. As OpenSSL 3.0 matures and becomes supported by more products, VSI will look to replace SSL111 with SSL3; however until this time SSL3 should be considered experimental and is being provided in order to allow customers and partners to investigate modifying their applications to work with this new OpenSSL version. SSL3 is also a key component of VSI's security roadmap to ensure that the OpenVMS operating system and applications running on OpenVMS are able meet relevant security requirements by supporting specific features such as FIPS. SSL3 can be safely installed and used alongside SSL111.

For a good overview of OpenSSL 3.0, details of what has changed, and information for migrating applications from OpenSSL 1.1.1 to OpenSSL 3.0 see https://www.openssl.org/blog/blog/2021/09/07/OpenSSL3.Final/ and links contained therein."

WebUI

- RESTful OpenVMS management interface
- Bowser-based UI

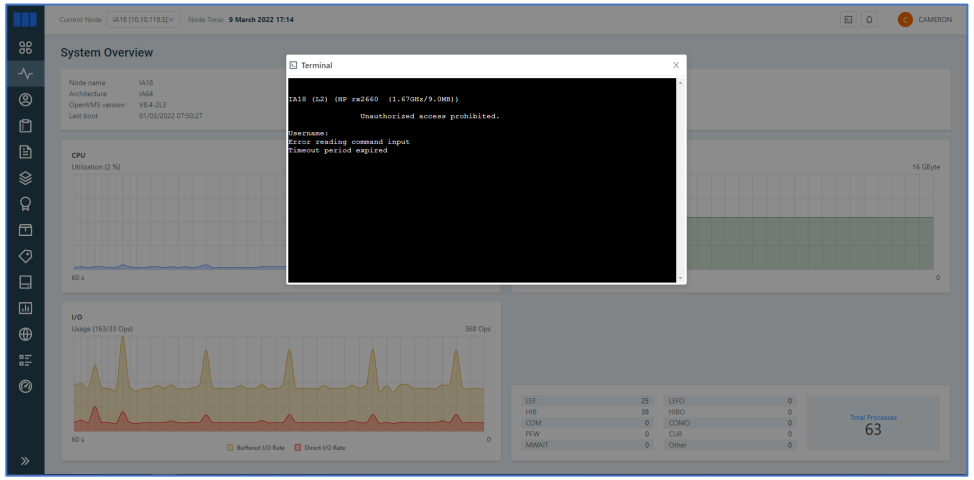


- User management and rights identifiers
- Process management
- Batch and printer queues
- File systems/disks
- XFC metrics
- WebSockets-based terminal interface
- CPU and memory usage
- Installed products
- Monitoring/alerts (device errors, intrusions, …)
- License management
- System parameters
- Management of system logical names
- TCP/IP configuration management
- Reports (system health check, user-written scripts)
- Support for plugins
- Performance monitoring via an optional plugin component for PERFDAT
- REST API

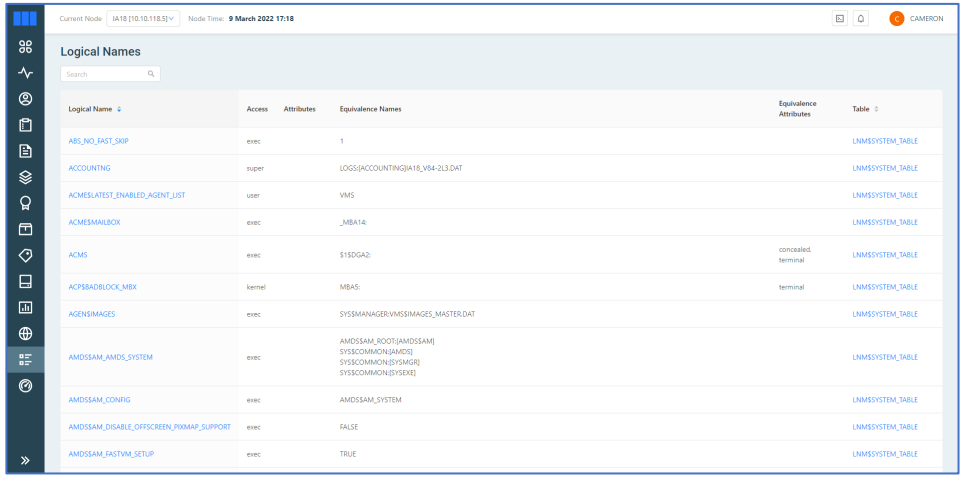
- Basic idea is to provide a web-based interface to various OpenVMS functions
- Would primarily be used for system management
- May be used to help facilitate remote management of systems

WebUI

System overview and terminal interface:



Logical names:



The WebUI product continues to evolve with the addition of new functionality and usability enhancements to. The latest release (V4.0-2) includes a WebSocket-based terminal interface, management of system logical names, XFC metrics, and various other new features.

ACMS integration

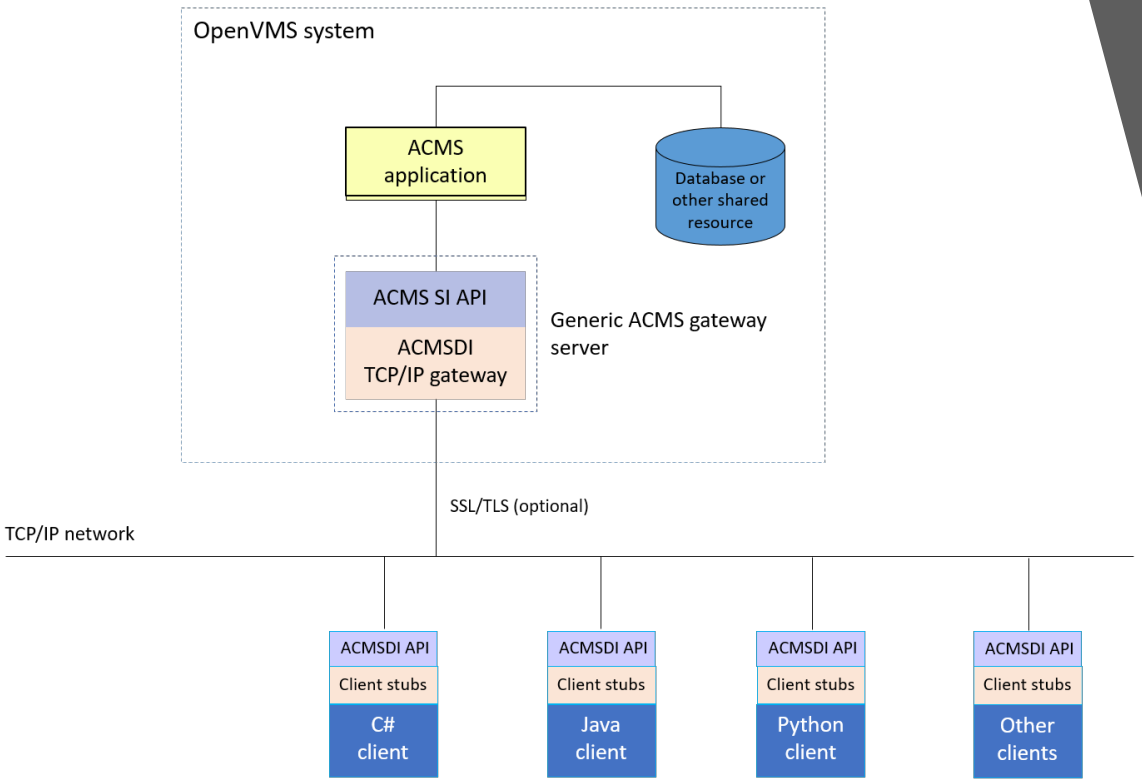
- Significantly updated ACMS gateway
- Much like old ACMS Desktop Connector (TPware), only better ☺
- SSL/TLS support

- Powerful code generation facilities
  - Generates client stubs based on task and workspace definitions

- Multi-platform
  - Windows
  - Linux (and readily portable to other UNIX-variants)
  - macOS

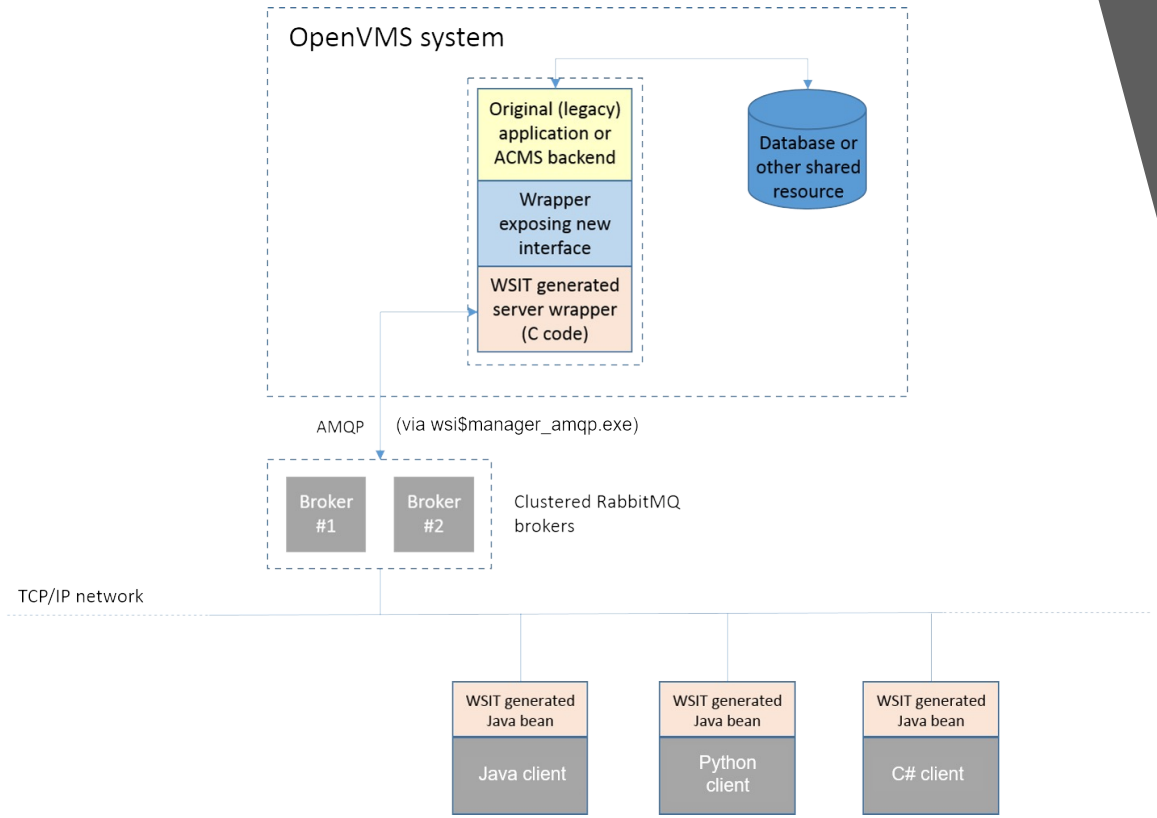
- Multiple client languages
  - C/C++
  - C#
  - Python
  - Java
  - …

Also looking at resurrecting and updating the ACMS remote management interface to provide a RESTful API, and to potentially provide an optional WebUI module that will hook into this functionality.



WSIT updates

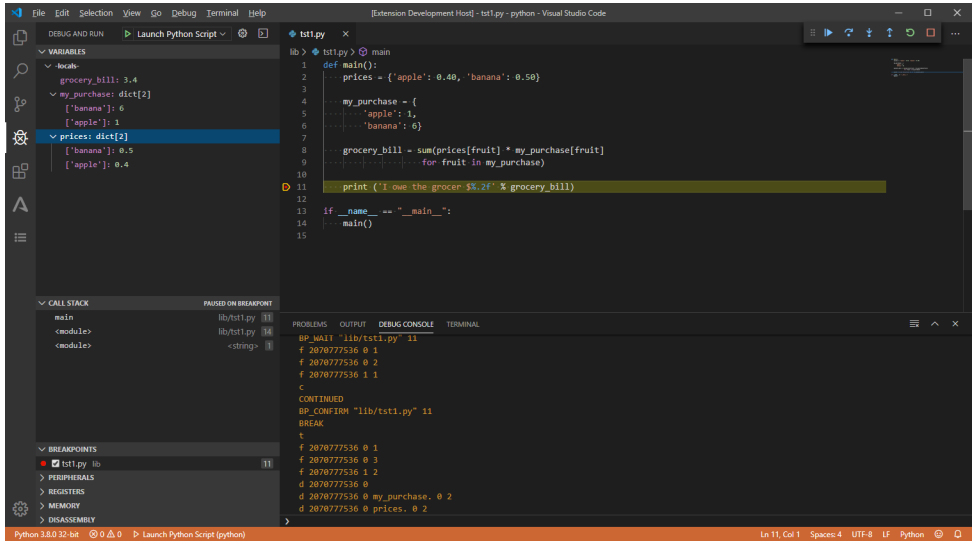
- Web Services Integration Toolkit (not really anything to do with web services)
- An extensible API-level integration technology
  - Facilitates the integration of new or existing OpenVMS 3GL and ACMS code with the worlds of Java, Python, C#, and JavaScript
  - Very powerful code generation facilities
  - Efficient runtime
  - Understands OpenVMS datatypes and argument passing mechanisms
- Additional language bindings
  - C#
  - Python
  - JavaScript
- Additional protocols
  - AMQP with RabbitMQ
  - …
- Seamless integration with legacy OpenVMS 3GL and ACMS applications
  - Windows
  - Linux (or other UNIX variants)
  - macOS
  - …



VSC IDE extension

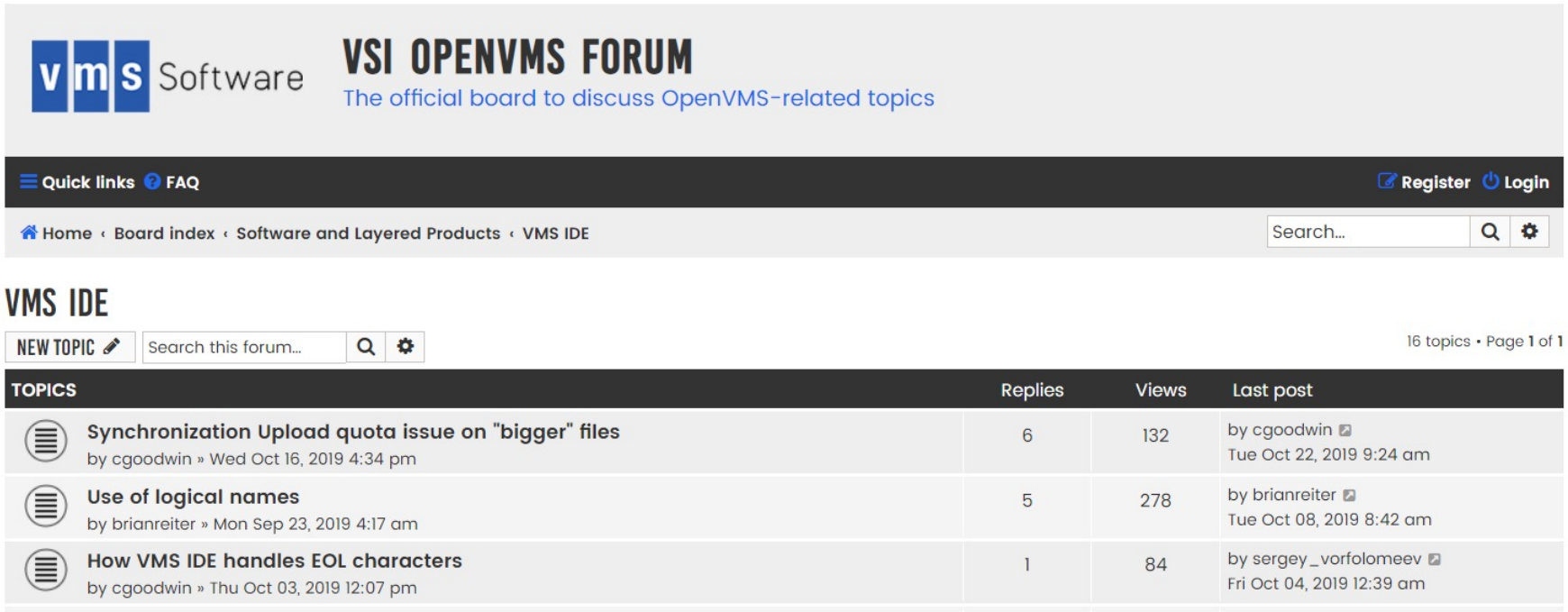
- Based on Microsoft Visual Studio Code
- Source code synchronization between the local machine and OpenVMS system
- Just need SSH connectivity to the OpenVMS system
- Debugger for OpenVMS 3GL, JVM, and Python projects
- Syntax highlighting for MMS, CLD, MSG, and 3GL languages
- Currently supported languages include C/C++, Fortran, COBOL, Pascal, BASIC, Python, and Java
- Alpha, Integrity, and x86-64
- Works with HPE and VSI versions of OpenVMS
- Can be used on Windows, Mac, and some Linux flavours
- Works with VSCodium and other Visual Studio Code variants

Latest updates include various enhancements for large projects (with multiple dependencies), various minor bug fixes, and updates to support VSI OpenVMS on x86-64 with OpenSSH. And there are various other enhancements in the pipeline.



VSC IDE extension

- Wiki page… https://www.vmssoftwaretraining.com/wiki/VMS_IDE
- Videos… https://www.youtube.com/watch?v=Ib1Fo6cG1Vs&list=PLewDXk9a8laO3cAZFPyZ4bbgcKsJ1qgPo&index=1
- Discussion forum… https://forum.vmssoftware.com/viewforum.php?f=29
- Download from Microsoft Marketplace
  https://marketplace.visualstudio.com/items?itemName=VMSSoftwareInc.vms-ide



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In progress

- VDD
- System Health Check (SHC)
- PERFDAT
  - Enhancements in progress
- SSIO
- VMSSPI
- A few other things

VDD (partial CDD replacement)

The CDD replacement project
[… your mission, should you choose to accept it]

- Create a (partial) replacement product for CDD
- No dependencies on any 3rd party software
- Doesn't need to do everything that CDD does (somewhat over-engineered)
- Needs to address common requirements

At a very high level the cunning plan is simple: create a replacement product for CDD that replicates as closely as possible the functionality that is required by VSI products.

VDD (partial CDD replacement)

The aims of the project

We need to create a partial replacement for the Oracle CDD product that addresses most of the requirements of VSI products that depend on CDD, which includes the languages compilers, ACMS, DECforms (development), DATATRIEVE, and others. Ideally there should need to be minimal change to any of these VSI products and the replacement solution should require minimal change from a customer perspective for them to use it with their existing application code.

Develop a replacement for CDD REPOSITORY OPERATOR that is able to parse, store, update, delete, and export data definitions.

The tool should replicate exactly the existing syntax for defining data types and it should implement as closely as possible a yet to be determined subset of CDO commands.

Develop a replacement for CDDSHR.EXE that provides an equivalent API to the existing Oracle CDDSHR.EXE.

VDD (partial CDD replacement)

- Still a few months of work remaining
- Pretty much complete support for CDO language
- Working with COBOL and C compilers
  - Should work with other language compilers, but not yet tested
- Currently focussing on support for ACMS

```
define field empl_number datatype text size 10.
define field empl_name datatype text size 30.
define field empl_street_address datatype text size 30.
define field empl_city datatype text size 20.
define field empl_state datatype text size 2.
define field empl_zip_code datatype text size 10.

define record employee_info_record.
   empl_number.
   empl_name.
   empl_street_address.
   empl_city.
   empl_state.
   empl_zip_code.
end record.
```

```
COPY
    "employee_info_record " FROM DICTIONARY
END COPY
```

System Healthcheck (SHC)

- Remember the old HPE System Healthcheck:

> *"System Healthcheck (SHC) is a suite of tools that assesses the health of your computing environment by identifying security, performance, and configuration problems before they can impact your critical operations. These tools are used to support the SHC assessment service."* (HPE)

- We've had quite a few requests to provide something similar
- Conducted a survey to assess interest...

Would you be interested in using a Systems Health Check tool to assist in keeping any critical operations running efficiently?
Showing the most recent responses to the question. See all responses here.
Yes
91.67%
No
8.33%

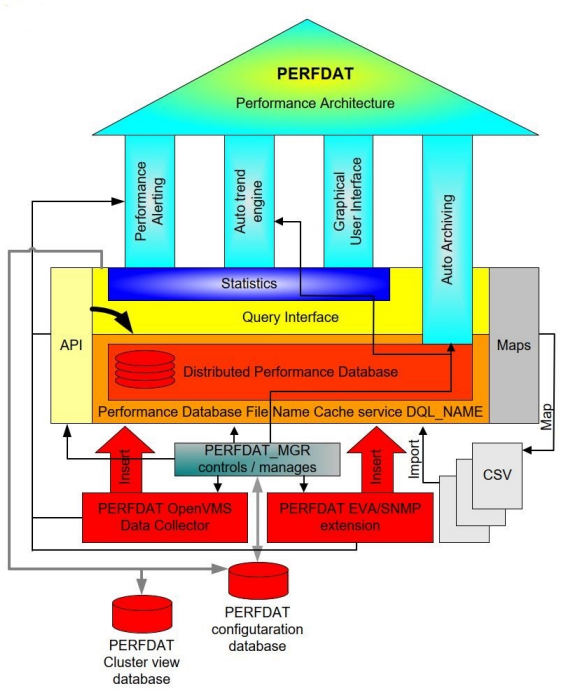
- Now talking with subset of survey respondents to better assess requirements
- Not possible to move forward with the old SHC "product"
  - Long story ☺
  - Will need to implement a replacement product
  - Still in early stages
  - Feel free to provide us with any thoughts you might have!

Response	Average rank	Ranked 1	Ranked 2	Ranked 3
Security	1.7	50.47%	31.78%	17.76%
Performance	1.9	37.38%	40.19%	22.43%
Configuration	2.5	12.15%	28.04%	59.81%

PERFDAT

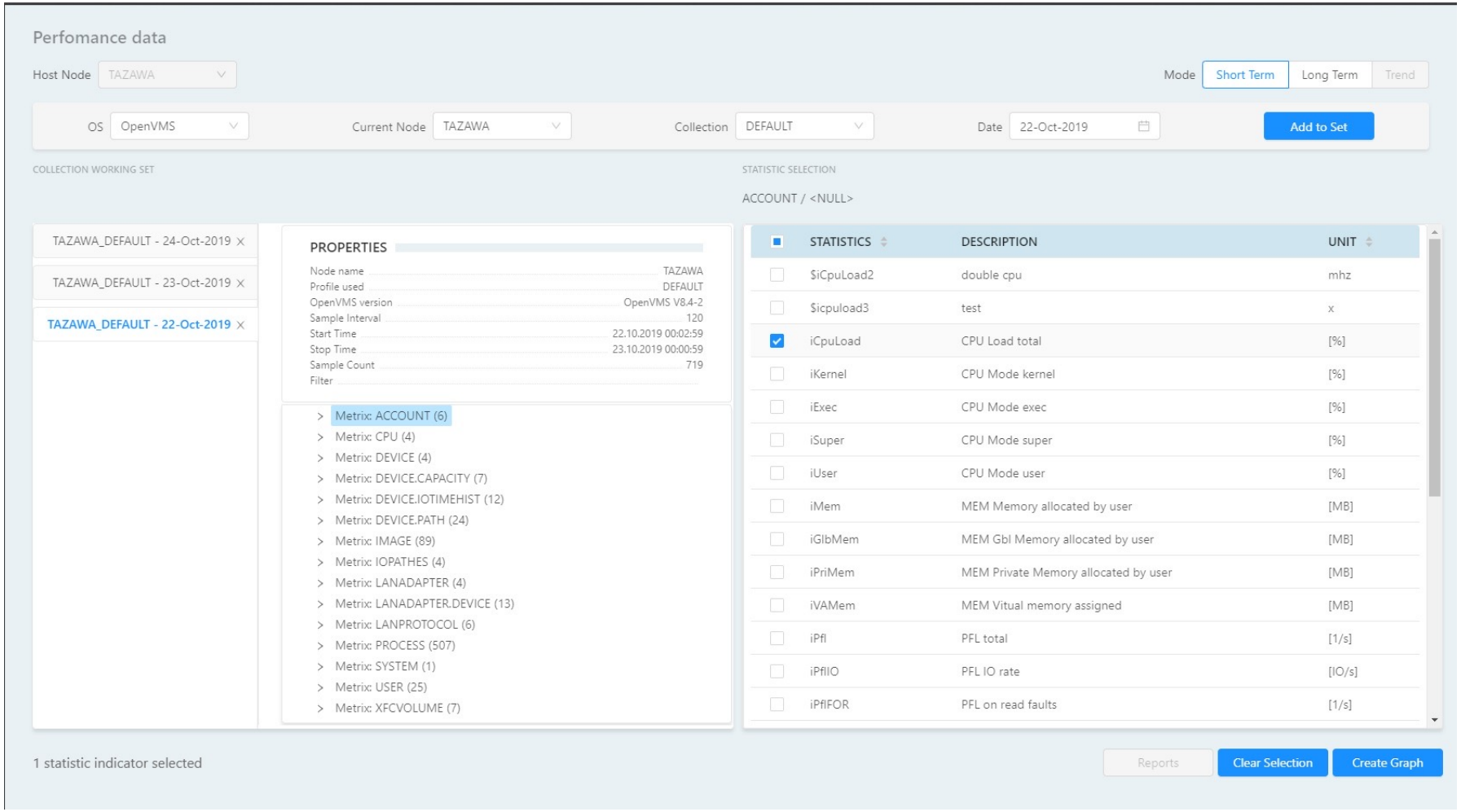
- Acquired from HPE a little while back
- Integrated performance monitoring, management, and capacity planning solution for OpenVMS
- Standalone product, pricing per-server or enterprise
- Alpha, Integrity... and now ported to x86-64
- Has been integrated with WebUI
- Powerful, fine-grained alerting sub-system
- Programmable API (custom extensions)
- Associated services
  - Capacity planning
  - Performance troubleshooting
  - ...

- Several recent enhancements...
  - sftp support to transfer archive data
  - Tidied up kit/installation
  - Integration with Prometheus (https://prometheus.io/)
  - Enhancing documentation (ongoing)



PERFDAT is a performance and capacity planning solution that is capable of supporting all performance and capacity planning related activities during the lifetime of an OpenVMS system.

PERFDAT – WebUI integration



PERFDAT – WebUI integration

SSIO

The problem:

- On OpenVMS concurrent POSIX `write()` calls to the same file can corrupt data
  - POSIX I/O on OpenVMS not atomic
  - Data updates can get lost
  - Can get mixed data from overlapping writes
  - Consistency is not guaranteed for files opened for shared write

- This *significantly* complicates (or prevents) porting many open source programs to OpenVMS
  - Programs must provide atomicity on their own
  - Extra coding to ensure data integrity
  - Non-trivial
  - Generally has performance ramifications (additional I/O's, frequent flushes)
  - Much pain and suffering

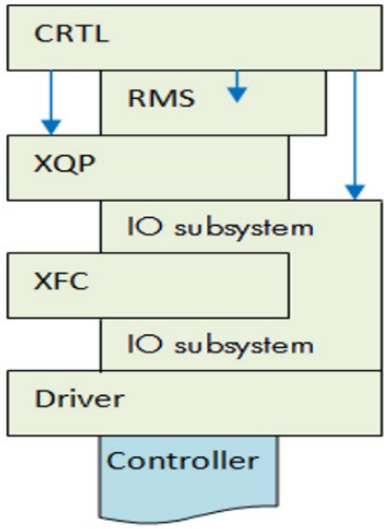
Fundamentally… OpenVMS does not provide POSIX-compliant shared read/write to byte stream files.

SSIO

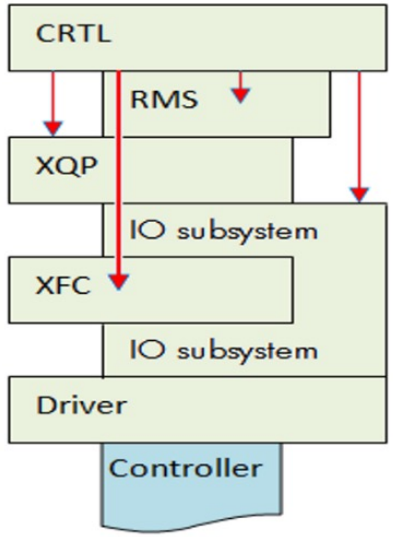
Enter SSIO:

- Shared Stream I/O
- Existing APIs and options remain unchanged
- Switches to enable SSIO on a per-application basis
- CRTL only
- Applications using RMS and QIO calls cannot use SSIO

Current design



SSIO design



SSIO

Required changes:

- XFC
  - Existing code for native OpenVMS I/O unchanged
  - Provide new byte-range I/O API
  - New code to update only part of a block; atomic up to `SSIO_MAX_ATOMIC_IO` bytes
  - Lock all affected buffers during block I/O

- CRTL
  - Able to call new XFC API to do byte-range I/O

- RMS, XQP
  - Various changes to support SSIO operations
  - No change in behaviour for existing API's

SSIO

End result:

- Porting becomes easier (and quicker)
  - Promotes UNIX portability
  - No writing of extra OpenVMS-specific code to assure data integrity

- Better performance of various products
  - Java
  - Samba
  - Apache HTTPD
  - GNV
  - …

Status:

- Limited/restricted field test
  - Let me know if interested in testing
  - Requires VSI OpenVMS 8.4-2L3 with latest patches/updates
- Will be released as a 8.4-2L3 update (Integrity)
- Will not be included in 9.2 for x86-64, but expected to be in 9.2-1

VMSSPI

- HP OpenView Smart Plug-In (SPI) for OpenVMS
- Decoupled from OpenView
- Adding ability to publish metrics and alerts to alternative destinations
  - Splunk
  - Dynatrace
  - Datadog
  - Message queue(s)
  - Custom
  - ...

- Uses existing configuration file (`vmsspi$configuration.dat`)
- Collects exactly the same data
- Just send information somewhere different

- Relatively early stages of development
  - Working prototype
  - Need to sort out message templates and destination support modules
  - Expect to see more on this soon

A few other things

- OpenSSH (Beta)
  - https://www.openssh.com/, https://github.com/openssh/openssh-portable
  - Open Source (BSD licensed)
  - Complete implementation of the SSH protocol (version 2)
    - Secure remote login
    - Remote command execution
    - File transfer
  - Installed as a separate product
  - Supersedes SSH services previously provided by TCP/IP Services
  - Alpha, Integrity, x86-64
  - Will likely also provide support on HPE OpenVMS 8.4 as well as for VSI OpenVMS versions

- OpenJDK (update pending)
  - Security updates
  - Including TLS 1.3 support
  - Will not do much more with OpenJDK until native compilers (C/C++) available for x86-64
  - Port current version to x86-64, then work on later version
  - Cannot go beyond OpenJDK8 for Integrity due to C++ standards support limitations (not an issue on x86-64)

OpenJDK

A few other things

- Apache HTTPD (CSWS)
  - Working on new version (2.4.51)
    - Will be available very soon
  - Current ports are based on original port done in late 90's
  - Numerous CRTL enhancements since this time
  - Investigating how we can do things better
    - Streamline doing new releases (as per OpenSSL and OpenLDAP)
    - Take greater advantage of CRTL enhancements
    - Leverage SSIO

- OpenLDAP
  - Working on new version (2.6.1)
  - API changes
    - Not backward-compatible with previous versions
  - Will also release new ACME LDAP that uses new OpenLDAP client

- PHP
  - Working on new version (PHP 8.0.10)
  - Need to complete testing
  - Integrity and x86-64

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New solutions

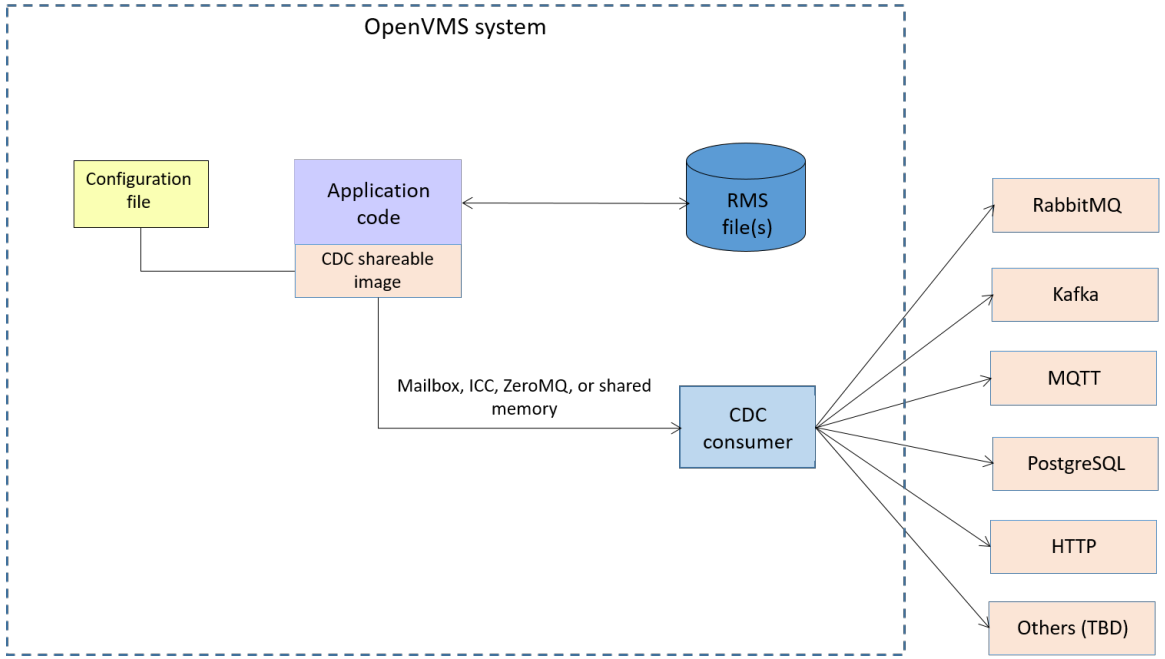
- RMS Change Data Capture
- Splunk interface
- WebForms
- OpenVMS Service Control (OSC)

Change Data Capture

- CDC (Change Data Capture) for RMS files
- Near real-time technology for capturing changes made to RMS records and publishing those changes

- Many OpenVMS users employ RMS files for data storage
- An efficient means of tracking changes to such files is of interest to many of these users
  - Event-driven architecture (EDA)
  - Regulatory compliance/auditing of events/operations
  - Data warehouse(s)
  - Single source of truth
  - Zero-downtime data migration activities
  - …

Sustained message rates of greater than 15000 messages per second have been achieved using RabbitMQ, although it should be noted that the ability to achieve a particular rate is dependent upon many variables.



Change Data Capture

Main components:

- CDC API
  - Single shareable image must be linked with RMS-based application (opt-in strategy)
  - No application code changes required
  - Simple configuration (list files of interest and file operations of interest)
  - Minimal impact on application operation
  - Changes written asynchronously to CDC Consumer

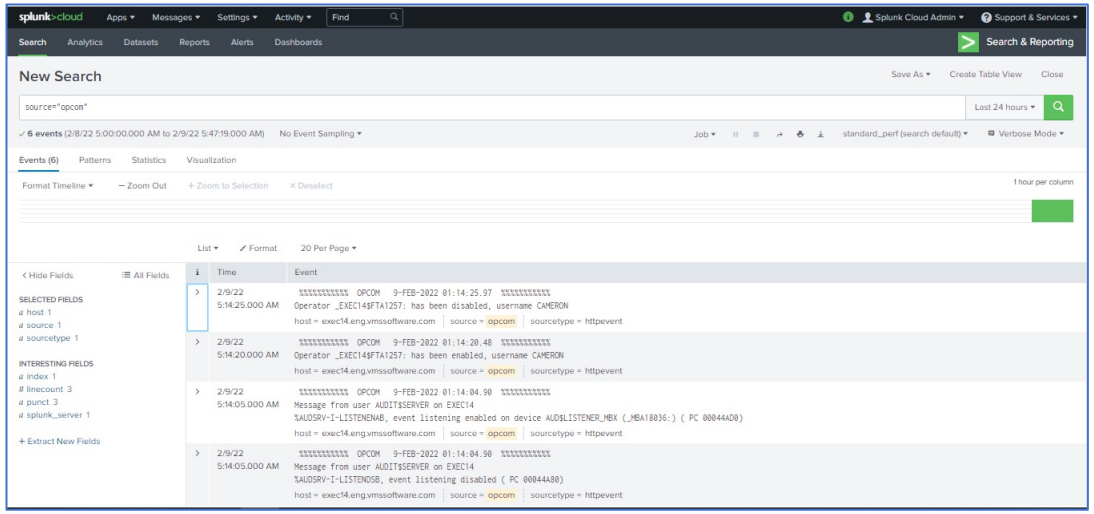
- CDC Consumer
  - Somewhat generic RMS query and record mapping tool
  - Can be used to query RMS files based on defined record definitions
  - Can transform read records into various formats (JSON, CSV, SQL, ...)
  - Can consume data published by CDC API
  - Can publish transformed data to a variety of consumers...
    - RabbitMQ (baked in)
    - Kafka, Redpanda
    - REST (HTTP)
    - MQTT
    - PostgreSQL, CockroachDB
    - Roll your own

The current status of this project could be described as an advanced prototype. Input from customers will be required to identify functional gaps and operational issues.

Splunk interface

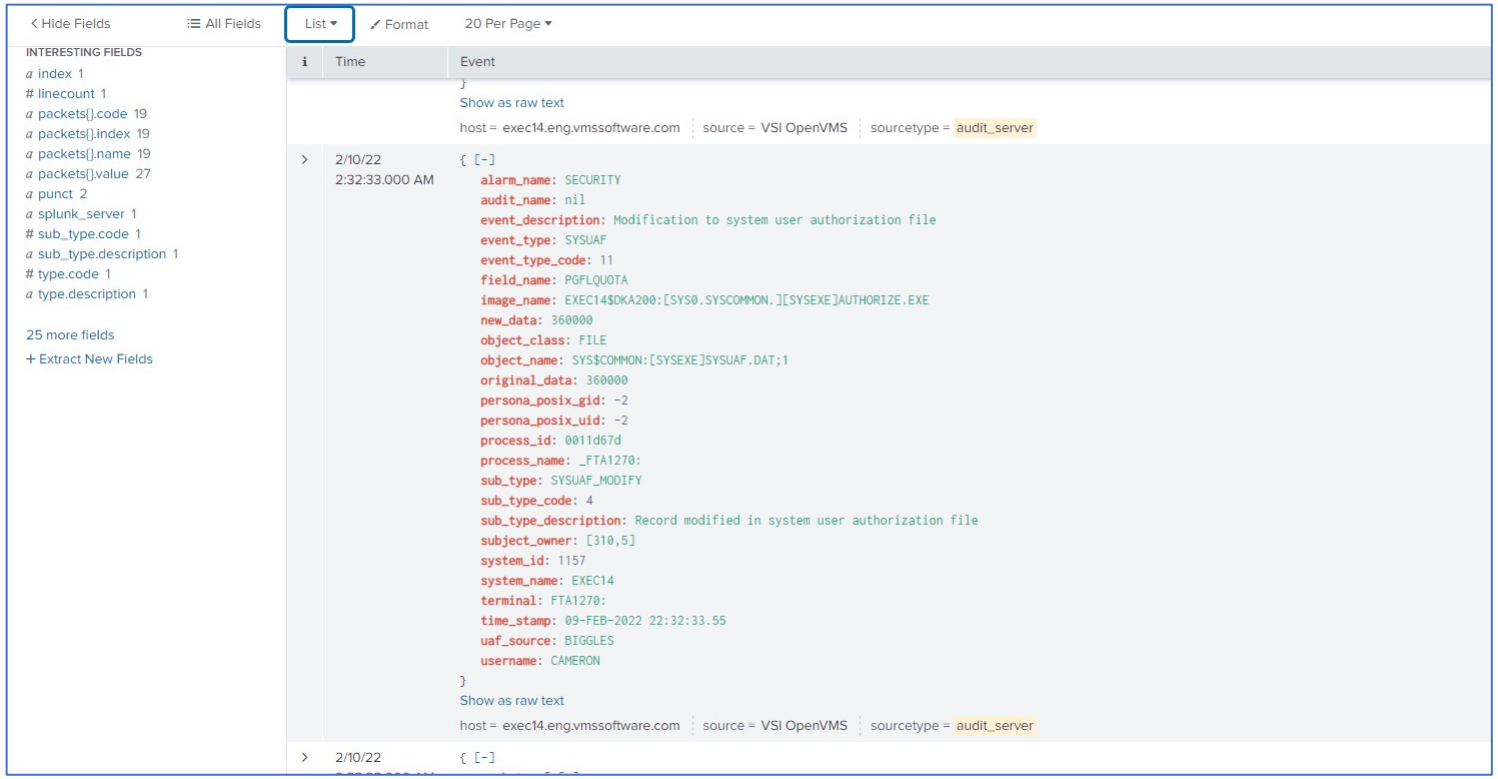
- OpenVMS interface to Splunk (https://www.splunk.com/)
  - All audit server messages (superset)
  - Error log messages
  - Intrusions
  - OPCOM messages

- Currently have a working prototype
- Need to implement a few more features
  - Filtering
  - Control of message content (basic, detailed)
  - …



Splunk interface

- Solution may be readily adapted to work with other similar products
  - Elasticsearch
  - Datadog
  - Dyantrace
  - …

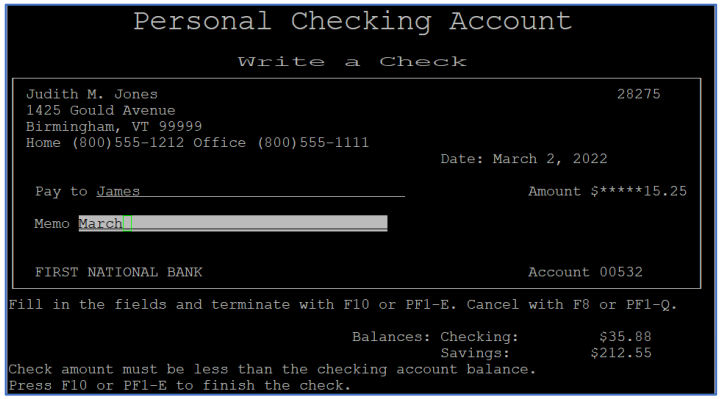


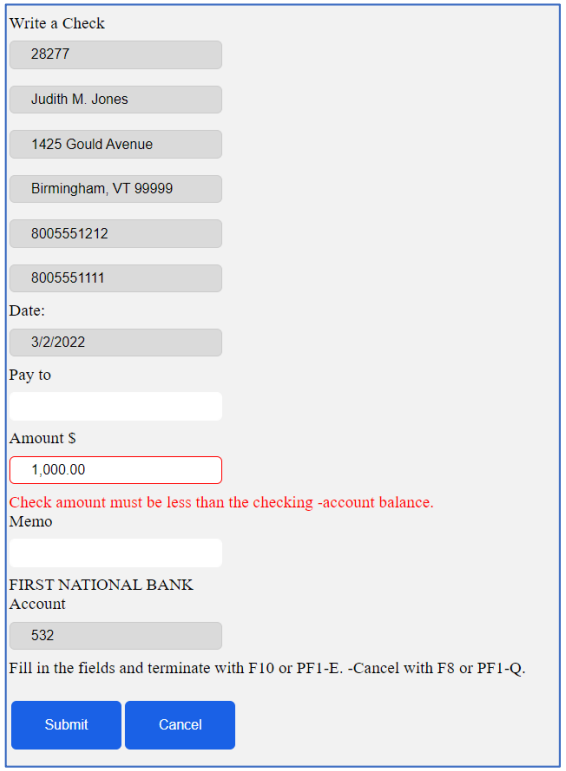
WebForms

- Semi-automated conversion of DECforms applications to web (React JavaScript framework)
- Either as a distinct project or as part of a larger application modernization programme
- Customizable templates and stylesheets
- IFDL parser generates UI and backend code
- Communication between browser-based UI and backend via WSIT/RabbitMQ RPCs (AMQP)

- Will be provided as a solution...
  - Product plus services
  - Pricing based on scale and complexity of conversion
  - No runtime license
  - Resultant converted code can be modified and maintained going forward

- Still some work to be done...
  - Session management needs to be improved
  - Layout manager
  - ...





OpenVMS Service Control (OSC)

- OpenVMS Service Control (OSC)
- Acquired along with PERFDAT
- Makes non-cluster aware applications more highly available
- Heavily based on Veritas Cluster Server for Linux
- Standalone product, pricing per-server or enterprise
- Support and services available (for a fee)
- Alpha and Integrity... and eventually x86-64

- Rebranded old GUI and updated for Windows 10+
- Started work on new GUI

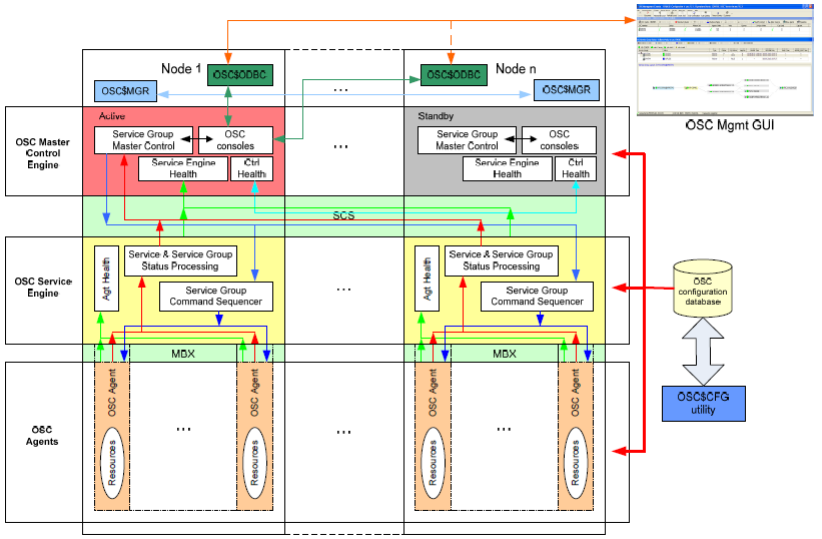
OpenVMS Service Control (OSC)

- Monitor the health of a service
  - Application plus all its required hardware and software resources (disks, shadow sets, network interfaces, ...)
- Automatically relocate services to another cluster node due to service or system failure
- Service switchover on user request

- Able to handle essentially any kind of application
  - Easily extendable (API)
  - Reuse of exiting management scripts (start-up, shutdown, and monitor scripts)

- Straightforward to configure and control
  - OpenVMS CLI or Windows GUI

- Powerful event notification capabilities
  - Ordered by occurrence
  - User-definable event notification mechanism



Agenda

- Introduction
- Some recent product updates
- In progress
- New solutions
- Summary
- Questions

Summary

- While getting the OpenVMS x86-64 production release out the door is clearly the main focus, we've also been working on a pile of other things...
  - New and updated open source products
  - Product enhancements
  - Brand new products
  - Additional service offerings
  - ...

- And there's plenty more in the pipeline that I can't tell you about just at the moment ☺
  - We are thinking about life beyond VSI OpenVMS 9.2
  - Watch this space!

But to finish off, here's a little picture of one of our development clusters (in Sweden) that includes Alpha, Integrity (physical servers and HPVM), and virtualized x86-64 nodes. By the time I've given this talk, the x86-64 nodes will have been updated to VSI OpenVMS 9.2 FT.

View of Cluster from system ID 43109 node: KVASER

SYSTEMS			MEMBERS
NODE	HW_TYPE	SOFTWARE	STATUS
KVASER	HP BL860c (1.67GHz/9.0MB)	VMS V8.4-2L3	MEMBER
SKOGUL	AlphaServer ES45 Model 1B	VMS V8.4-2L2	MEMBER
GONDUL	AlphaServer ES45 Model 2	VMS V8.4-2L2	MEMBER
GEFJON	HP BL860c (1.67GHz/9.0MB)	VMS V8.4-2L3	MEMBER
TRUD	QEMU	VMS XG5D-H4S	BRK_NON
BALDER	QEMU	VMS XG4O-H4S	MEMBER
HERMOD	QEMU	VMS XG4O-H4S	MEMBER
VILE	_HP_ VMM (1.67GHz/9.0MB)	VMS V8.4-1H1	MEMBER
VALE	_HP_ VMM (1.67GHz/9.0MB)	VMS V8.4-2L3	MEMBER
VIDAR	_HP_ VMM (1.67GHz/9.0MB)	VMS V8.4-2L3	MEMBER
VE	_HP_ VMM (1.67GHz/9.0MB)	VMS V8.4-1H1	MEMBER
SKULD	QEMU	VMS V9.1-A	MEMBER
URD	_HP_ VMM (1.67GHz/9.0MB)	VMS V8.4-2L3	MEMBER
SKADE	QEMU	VMS XG4O-H4S	MEMBER
NANNA	QEMU	VMS XG4O-H4S	MEMBER
ODEN	QEMU	VMS XG5D-H4S	MEMBER

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Questions?