License Management on Integrity Servers

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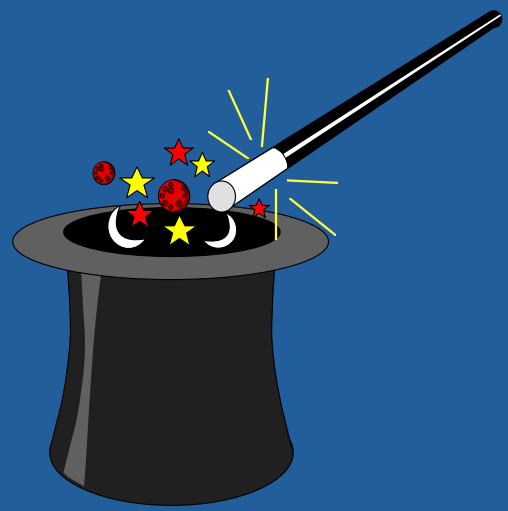


Agenda

- LMF on Alpha
- The New Integrity Business Practices
- LMF Architecture on I64

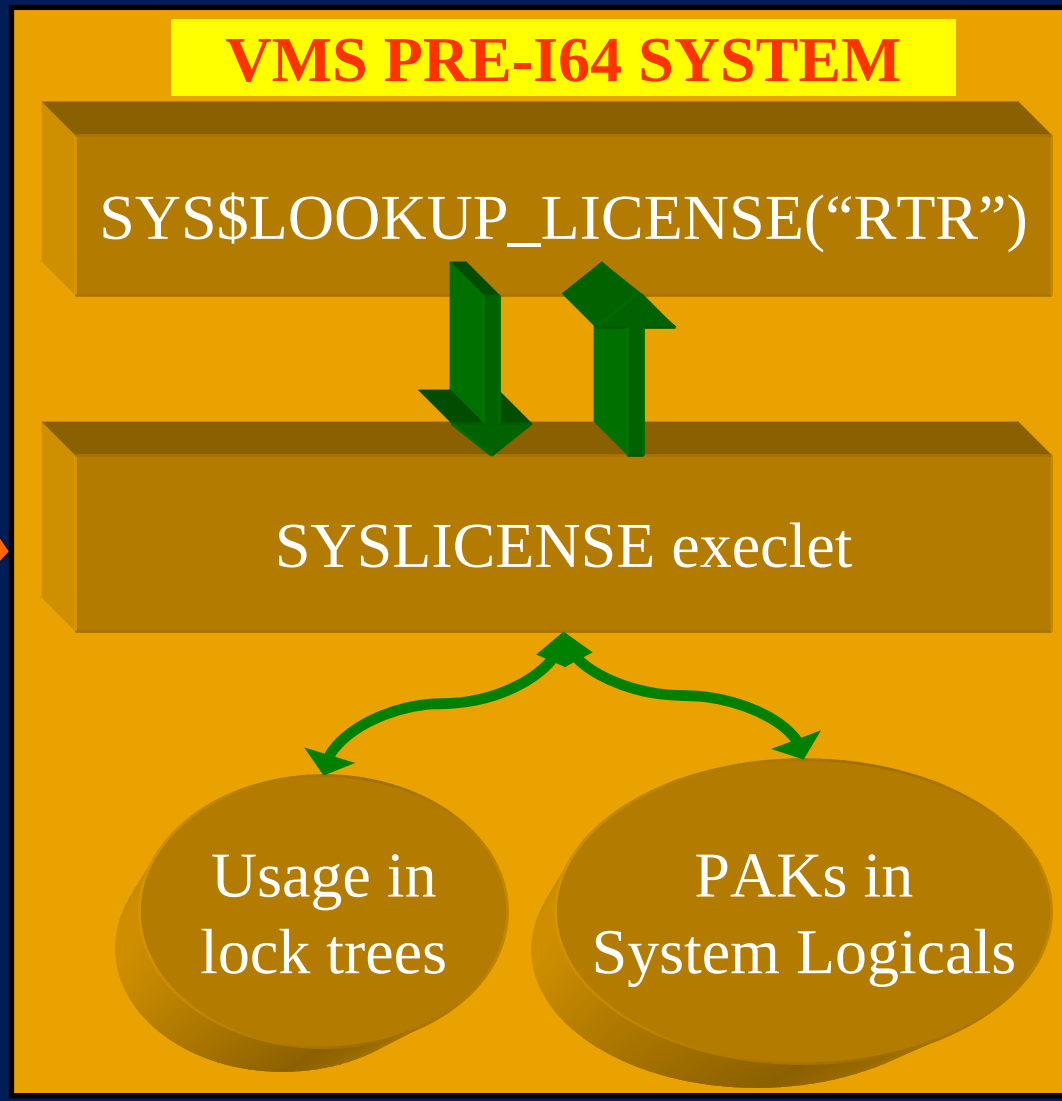
How it works - Alpha

```
$ LICENSE REGISTER RTR -
/ISSUER=DEC -
/AUTHORIZATION=QLMT1AQ6R -
/PRODUCER=DEC -
/UNITS=2800 -
/ACTIVITY=H -
/OPTIONS=(NO_SHARE) -
/CHECKSUM=2-IAMA-VERY-DUMB-PAKA
$ LICENSE LOAD RTR
```

RTR license

registered and loaded

for GS320



How it works – Alpha

```
CHOBE> show license/char
VMS/LMF Charge Information for node CHOBE
This is a AlphaServer GS160 6/731, hardware model type 1968
Type: A, Units Required: 3400   (VAX/VMS Capacity or OpenVMS Unlimi
Type: B, * Not Permitted *      (VAX/VMS F&A Server)
Type: C, * Not Permitted *      (VAX/VMS Concurrent User)
Type: D, * Not Permitted *      (VAX/VMS Workstation)
Type: E, * Not Permitted *      (VAX/VMS System Integrated Products)
Type: F, * Not Permitted *      (VAX Layered Products)
Type: G, * Not Permitted *      (Reserved)
Type: H, Units Required: 1150   (Alpha Layered Products)
Type: I, Units Required: 1150   (Layered Products)
```

- **Charge information**
  - **Retrieved from the console (Using EXE$DSRDB_LURT)**
  - **Provided by the Alpha group**
- **Static group licenses**
  - **Implemented in SYS$LOADABLE_IMAGE:LMF$GROUP_TABLE.EXE**
  - **NET-APP-SUP-xxx**

Agenda

- LMF on Alpha
- The New Integrity Business Practices
- LMF Architecture on I64

hp OpenVMS I64 Operating Environments

Operating Environment Packaging

- **Introduce OpenVMS packaging consistent with HP-UX OEs**
- **Provides a 3 tier pricing paradigm (good, better, best)**

OpenVMS I64 Operating Environments:

- **Foundation OE (FOE) Base**
  - An **internet ready**, rich feature set for **price sensitive** customer
- **Enterprise OE (EOE)**
  - A **higher cost** feature set that enhances the customer experience in areas of **manageability, single system availability and performance**
- **Mission Critical OE (MCOE)**
  - Has the **highest cost**, but delivers the ultimate customer experience in terms of **multi-system availability and workload management**

HP OpenVMS Integrity Packaging

OpenVMS Integrity Mission Critical Operating Environment

OpenVMS Integrity Enterprise Operating Environment

OpenVMS Integrity Foundation OE

- OpenVMS Operating System
- **OpenVMS Unlimited User Licensing**
- TCP/IP Services for OpenVMS
- DECnet-Plus for OpenVMS End System
- DECwindows Motif for OpenVMS
- DECnet IV
- Performance Data Collector
- Web Agents
- WEBM / CIM

Integration Technologies
- Secure Web Server (SWS)
- Secure Web Browser (SWB)
- SDK for the Java™ Platform
- XML Technology
- NetBeans
- Simple Object Access Protocol (SOAP) Toolkit
- Kerberos
- Enterprise Directory
- CDSA
- SSL
- OpenSource Tools

Add to Foundation:
- **RMSjournaling**
- **VolumeShadowing**
- **DECram**
- **VMS Management Station**
- **Availability Manager – AM**
- **OpenView Performance Agent**

Add to Enterprise:
- **OpenVMS Clusters**
- **OpenVMS RTR Backend**

Note: Products listed in yellow are available as separately licensable products outside of OE package if desired.

One DVD media for all 3 OE's

Software Licensing Overview

Per-processor licensing (PPL)

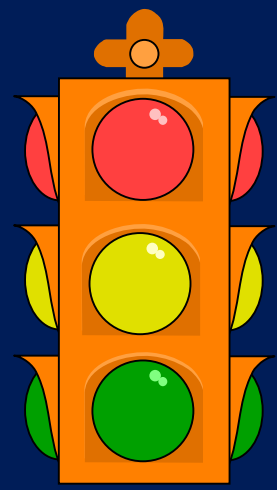
- Very **flexible** licensing design
- Purchase software based on the **# of CPUs** in a partition or system

Benefits of PPL

- **More granular** – customer pays for exactly what they need
- **More flexible** – licensing is not per box, but per-processor so customer can move assets as needed
- **Accommodates partitioning** – allows use of different types of OEs in different hardware partitions and different Operating Systems
- **Expandable** – customers can purchase processors and software to meet needs over time

SOFT COMPLIANCE

- PPL is based on licensing CPUs
- 1 unit per running CPU on node
- 3 states
  - Red - PAK is not loaded
    product cannot run (failure status returned)
  - Yellow - short 1 or more units as compared to # of CPUs
    product can run (success status returned, PPL tool will flag)
  - Green - units equal or greater than # of CPUs
    product can run (success status returned)



Agenda

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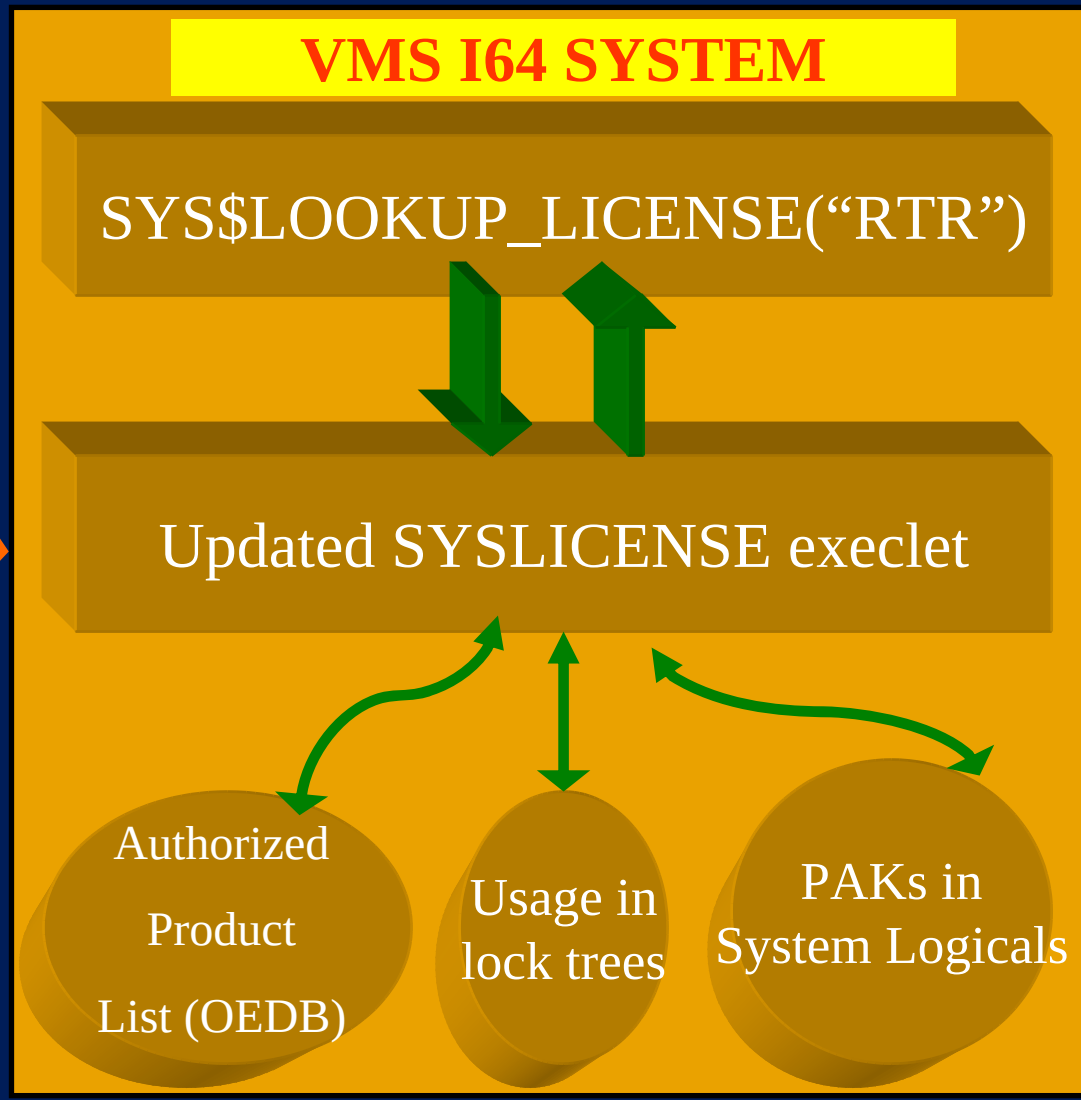
- LMF Architecture on I64

How It Works – PPL - Overview

```
$ LICENSE REGISTER MCOE -
/ISSUER=HP -
/AUTHORIZATION=QLMT1AQ6R -
/PRODUCER=HP -
/UNITS=4 -
/OPTIONS=(NO_SHARE, PPL, IA64) -
/CHECKSUM=2-IAMA-VERY-DUMB-PAKA
$ LICENSE LOAD MCOE
```

VMS MCOE PPL license registered and loaded for IA64 system for up to 4 CPUs



New PAK option keywords

- IA64 (required for every I64 PAK)
- PPL
- IA64_ALPHA
- IA64_ALPHA_VAX
- HARD_COMPLIANCE

- “Our” PAK producer has been changed to “HP”

Licensing Tiers

- On I64 LMF has the infrastructure to support tiering.
- LMF tiering support is implemented using the hardware-id field in the PAK.
  - CPU_SOCKETS=2 – the PAK may be loaded on RX2600 but will fail to load on RX4640
  - CPU_SOCKETS=UNLIMITED – the PAK may be loaded on any system

PAKGEN

- PAKGEN is the tool used for generating PAKs
  - Integrated in LMF
  - Activated by the /GENERATE qualifier
  - Requires PAKGEN license

- PAKGEN supports the new keywords
  - Support is integrated in V8.2
  - New PAKGEN license is required on I64

LICENSE LIST EXAMPLE

```
$ lic lis OPENVMS-I64-FOE/full
License Management Facility  V2.0

License Database File:       SYS$COMMON:[SYSEXE]LMF$LICENSE.LDB;1
Created on:                  11-DEC-2003
Created by user:             SYSTEM
Created by LMF Version:      V1.2

---------------------------------
Issuer:                      HP
Authorization:               TOPAZ-I64-FT-001
Product Name:                OPENVMS-I64-FOE
Producer:                    HP
Units:                       1
Modified Units:              4
Version:                     0.0
Release Date:                (none)
PAK Termination Date:         1-JUL-2004
Options:                     MOD_UNITS, IA64, PPL
Product Token:               *ENGINEERING_INTERNAL_USE_ONLY*
Hardware ID:

Revision Level:              2
Status:                      Active
Command:                     MODIFY
Modified by user:            SYSTEM
Modified on:                  2-FEB-2004 14:09:38.42
```

PAKs supported on I64

- On I64 we only support PPL licenses and Activity licenses
  - No support for availability licenses (no charge table)
  - No support for group table licenses
    - Group table licenses required reboot for content updating
    - LMF$GROUP_TABLE.EXE is built on Alpha & VAX only

- New PAK names
  - OPENVMS-I64-FOE (base O/S license is OPENVMS-I64)
  - OPENVMS-I64-EOE
  - OPENVMS-I64-MCOE

  - OPENVMS-I64-EDUOE (standalone OE)

Summary of the new LMF boot sequence

- @SYS$STARTUP:VMS$CONFIG-050_LMF.COM
  - Issue LICENSE START
- Create LMF resources and locks
- Generate charge table (I64 only)
- Load all valid licenses from the license database
  - Alpha & VAX are done at this point.
- Determine the number of CPU sockets
- Initialize the OE database
- Activate an OE

I64 Charge table

- No Charge table information in the console
- The charge table generated during system boot based on the number of CPUs
  - Each CPU requires 1 PPL unit
- The charge table is dynamic and is automatically being updated by the job controller when a CPU is stopped or started

```
IPL31> sh lic/char
OpenVMS I64/LMF Charge Information for node IPL31
This is an HP rx2600  (900MHz/1.5MB), with 2 CPUs active, 2 socket(s)
Type: PPL,   Units Required: 2  (I64 Per Processor)
IPL31>
```

The operating environment database

- The in memory operating environment database contains
  - List of the various OEs
  - OE hierarchical relationships
  - Standalone OEs
  - Each OEs content

- Derived out of SYS$MANAGER:LMF$OE.DAT
- Lives in Non-Paged Pool
- Database size is Less than 5KB

The operating environment database

- The OEDB is initialized during system boot (LMF START)
- Current OE enabled during boot
- OEDB content may be updated during the life of the system
  - Access is synchronized by locks
  - LICENSE LOAD/OEDB reloads the database

- Number of OE units is derived out of PAKs loaded on the system.
  - FOE units – 2
  - EOE units – 4
    - OEDB will show a total of 4 EOE units and 6 FOE units

Soft Compliance

- On VAX/Alpha a PAK will not be loaded if
  Required units != Available PAK units
- On I64 a PAK will be loaded if there is at least one unit available
  - RX4640 with 4 CPUs may load a 2 units FOE PAK
  - SHOW LICENSE/USAGE displays compliance info
  - The compliance report tool will tell customers if they are in compliance or not (remember the 3 states, red, yellow and green)

Soft Compliance

- We provide ISVs with the ability to force compliance for their products using the HARD_COMPLIANCE keyword

- When a licenses is loaded in a non-compliance mode, a warning will be signaled and sent to the operator log

```
IPL31> lic load openvms-i64-foe
%LICENSE-W-NCLOAD, HP OPENVMS-I64-FOE was loaded in noncompliant mode with 1
  unit(s). 2 units required

%%%%%%%%%%  OPCOM  19-MAY-2004 14:41:49.18  %%%%%%%%%%
Message from user GUY on IPL31
%LICENSE-W-NCLOAD, HP OPENVMS-I64-FOE was loaded in noncompliant mode with 1
  unit(s). 2 units required
```

Soft compliance

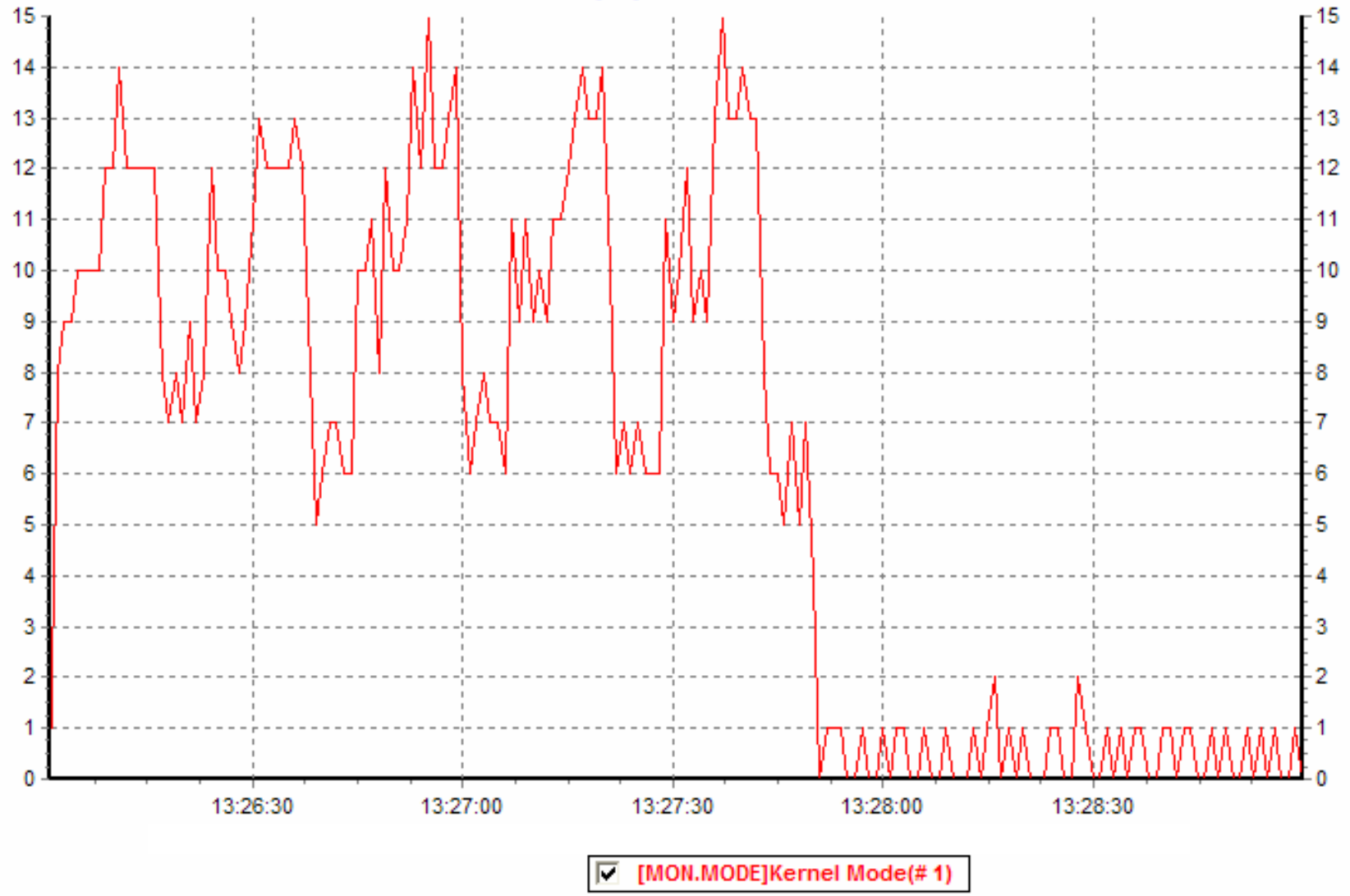
- Compliance is checked at boot time by the job controller
  - If all PAKs are compliant, compliance will be checked again in 90 days.
  - If non compliance licenses detected, a message is sent to the operator log and a mail message with the compliance information is mailed to the system account
  - Compliance is checked again after 60 days
    - If still not in compliance, mail messages will be sent to the system account every 7 days
  - The report is based on the output of $SHOW LICENSE/USAGE

Miscellaneous updates

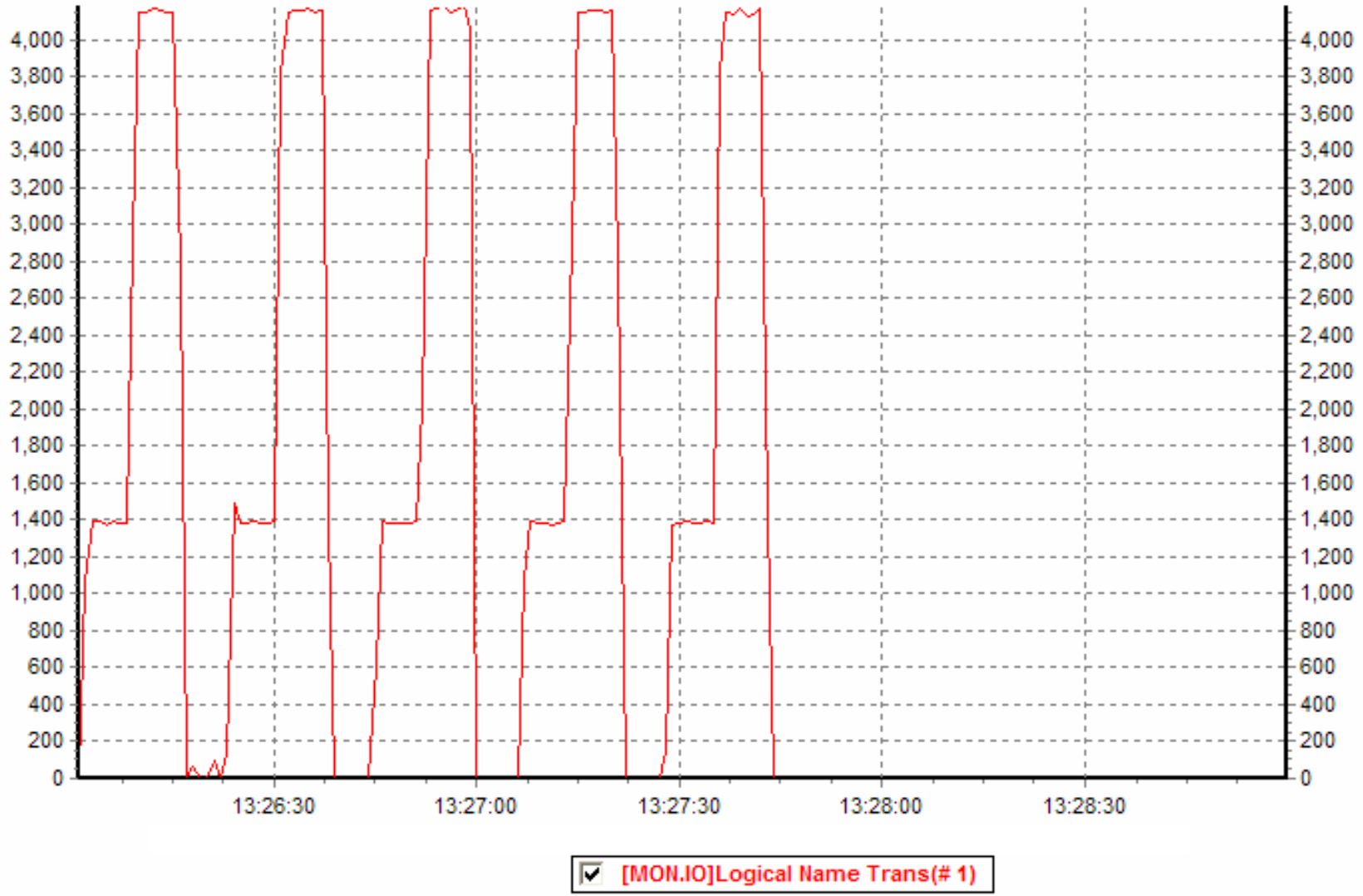
- SYS$UPDATE:VMSLICENSE.COM
  - Updated to support the new PAK keywords
- New DCL Lexical function – F$LICENSE
  - Returns true if the product is licensed to run on this node
  - Used by VMSINSTAL.COM to implement license checking
- Starting with V8.2, LMF is installed on both Alpha & I64
- LOGINOUT
  - Requires 1 or more {F|E|MC}OE PAKs
  - Unlimited users
  - Simple and straight forward
  - No changes on Alpha & VAX

Performance testing

- Initial performance testing showed that license lookup on I64 takes ~50% less system resources
  - Executed on rx2600 with 2 CPUs
  - 50,000 license lookup calls for a product with HP as the producer, using the I64 algorithm
  - 50,000 license lookup calls for a product with DEC as the producer emulating the Alpha algorithm
  - 50,000 license lookup calls for a product in the OE database


Node(s) : ADU26B
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
13:26:30
13:27:00
13:27:30
13:28:00
13:28:30
[MON.MODE]Kernel Mode(# 1)

Node(s) : ADU26B



SHOW LICENSE

```
IPL31> sh lic

Active licenses on node IPL31:

------- Product ID --------    ---- Rating -----  -- Version --
Product            Producer    Units PPL   Activ Version Release    Termination
C                  HP            250  0     1      0.0  (none)      6-FEB-2005
OPENVMS-I64-FOE    HP              1  1     0      0.0  (none)      (none)
OPENVMS-I64-MCOE   HP             10  1     0      0.0  (none)      (none)


IPL31> show license/full openvms-i64-mcoe

Active licenses on node IPL31:

OPENVMS-I64-MCOE
        Producer: HP
        Units: 10
        Version: 0.0
        Release Date: (none)
        Termination Date: (none)
        Per Processor License
        Activity: 0
        MOD_UNITS
        IA64
        Product Token: *ENGINEERING_INTERNAL_USE_ONLY*
```

SHOW LICENSE/USAGE

```
IPL31> show license/usage

View of loaded licenses from node IPL31                19-MAY-2004 14:01:43.39

------- Product ID --------   ---- Unit usage information ----------------
Product            Producer       Loaded  Allocated  Available  Compliance
C                  HP                250          0        250  Yes
OPENVMS-I64-FOE    HP                  1          1          0  No
                   *** 1 unit(s) loaded, 2 unit(s) required ***
OPENVMS-I64-MCOE   HP                 10          2          8  Yes


IPL31> show license/usage/full openvms-i64-mcoe

View of loaded licenses from node IPL31                  19-MAY-2004 14:02:39.94

PPL license HP OPENVMS-I64-MCOE usage information:
        Per Processor License
        Activity: 0
        Version:  0.0
        Release Date: (none)
        Termination Date: (none)
        Product Token: *ENGINEERING_INTERNAL_USE_ONLY*
    Units   Node
        2   IPL31
    Units loaded: 10    Units allocated: 2    Units available: 8
```

SHOW LICENSE/CHARGE/CLUSTER

```
IPL31> sh lic/char/clus
VMS/LMF Cluster License Unit Requirements Information   27-JAN-2004 10:09:04.60
  Node                A     B     C     D     E     F     G     H     I  PPL
MIKAXP               12     -     -     -     -     -     -  1050  1050    -
BLUSKY               12     -     -     -     -     -     -  1050  1050    -
IPL31                 -     -     -     -     -     -     -     -     -    2

Total Cluster Unit Requirements
Type: A, Units Required: 24     (VAX/VMS Capacity or OpenVMS Unlimited or Base)
Type: B, * Not Permitted *      (VAX/VMS F&A Server)
Type: C, * Not Permitted *      (VAX/VMS Concurrent User)
Type: D, * Not Permitted *      (VAX/VMS Workstation)
Type: E, * Not Permitted *      (VAX/VMS System Integrated Products)
Type: F, * Not Permitted *      (VAX Layered Products)
Type: G, * Not Permitted *      (Reserved)
Type: H, Units Required: 2100   (Alpha Layered Products)
Type: I, Units Required: 2100   (Layered Products)

Type: PPL,   Units Required: 2  (I64 Per Processor)
```

- The following command were modified to support PPL
  - LICENSE LIST
  - LICENSE REGISTER
  - LICENSE MOVE
  - LICENSE DELETE

SHOW LICENSE/OE

```
IPL31> show lice/oe/full
Current Operating Environment on node IPL31 at 19-MAY-2004
  14:05:07.40:

--------- Operating Environment ---------- ------ Units ------
Name     Description            Type Level   Loaded      Total
MCOE     Mission Critical         H    2          2          2
  RTR-SVR
  VMSCLUSTER
  VMSCLUSTER-CLIENT
  DECRAM
  RMSJNL
  VOLSHAD
  SYSMGT
  OPENVMS-I64
  OPENVMS-USER
  DVNETEND
  DW-MOTIF
  UCX
  TDC
  DCOM-MIDL
  X500-ADMIN-FACILITY
  X500-DIRECTORY-SERVER
IPL31>
```

SHOW LICENSE/HIER

```
IPL31> show lice/hier

                    Operating Environment Hierarchy
                    -------------------------------

--------- Operating Environment ---------- ------ Units ------
Name     Description             Type Level   Loaded      Total
MCOE     Mission Critical          H    2          2          2
EOE      Enterprise                H    1          -          2
FOE      Foundation                H    0          1          3
IPL31>
```

SHOW LICENSE/HIER/FULL

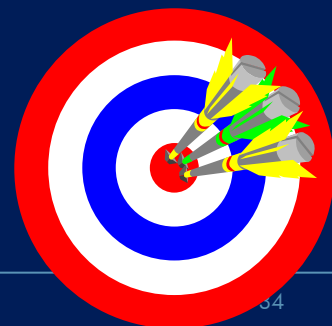
```
IPL31> show lice/hier/full

                    Operating Environment Hierarchy
                    -------------------------------

--------- Operating Environment ---------- ------ Units ------
Name     Description            Type Level   Loaded      Total
MCOE     Mission Critical         H    2          2          2
  RTR-SVR
  VMSCLUSTER
  VMSCLUSTER-CLIENT
EOE      Enterprise               H    1          -          2
  DECRAM
  RMSJNL
  VOLSHAD
  SYSMGT
FOE      Foundation               H    0          1          3
  OPENVMS-I64
  OPENVMS-USER
  DVNETEND
  DW-MOTIF
  UCX
  TDC
  DCOM-MIDL
  X500-ADMIN-FACILITY
  X500-DIRECTORY-SERVER
```

Mixed Arch Cluster

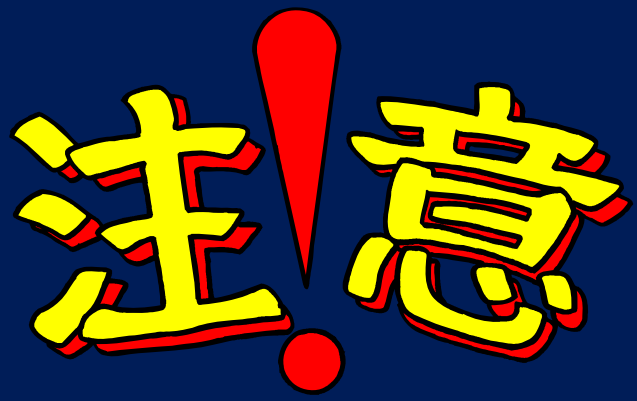
- Shared license database (LDB) for I64, ALPHA, and VAX cluster members
- Common code
  - ALPHA nodes have the ability to modify I64 PAKs

- VMS732_LMF-V0100 is required for Alpha V7.3-2

- The new PPL code is conditionalized to run on I64 only
  - Alpha&VAX nodes can not load PPL licenses



Hacking Alert



LMF & Logical names

- It is a known fact in the hackers community that LMF creates logical names representing each PAK loaded
  - Theoretically (and practically) one can create logical names instead of purchasing licenses

- These “hacks” do not work on I64

VMS82I_LMF-V0100

- The first LMF kit for integrity servers will be released by July 2005
  - Rated INSTALL_1
  - Removes the requirement for SYSLCK privilege for various SHOW LICENSE operations
  - Adds support for the educational program

New LMF features in OpenVMS V8.2-1

- Hard partition support
  - SHOW LICENSE/CHARGE now displays the maximum number of CPU sockets supported by the platform

```
$ sh lic/char
OpenVMS I64/LMF Charge Information for node SD00
This is an HP SD64A  (1.50GHz/6.0MB), with 8 CPUs active
This platform supports up to 64 CPU socket(s)
Type: PPL,   Units Required: 8  (I64 Per Processor)
```

- Units assignment tool

The units assignment tool

- The units assignment tool is designed to help customers distribute PPL licensing units across the cluster
  - Very useful when trying to create large configurations
  - The tool generates CSV file describing the current licensing environment across the cluster
  - The CSV file may be edited per the requirements of the customer
  - The tool can generate LMF scripts based on the content of the file
  - LMF$PPL_UNITS_ASSIGNMENT.COM

LMF Futures (OpenVMS V8.3)

- vPars (galaxy) support
- HP-VM support
- F$LICENSE to support 3rd party PAK producers


JUST DO IT.

FAQ

- Q: Can I share a license database between Alpha and I64

  A: Yes, sharing a license database between Alpha and I64 is fully supported. Management commands may be issued from any node in the cluster

- Q: Can I load a PPL license on Alpha

  A: No, PPL licenses may only be loaded on I64

- Q: What licenses maybe shared between Alpha and I64

  A: Activity licenses with the IA64_ALPHA keyword may be shared between Alpha and IA64

FAQ

Q: My PAKGEN license can't generate I64 licenses

A: To generate I64 licenses, a new PAKGEN license is required. Contact pakman@hp.com or the DSPP program to obtain a new PAKGEN license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