



# Hardware Inventory tool

For C1 CV UCELL System



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# VERSION HISTORY

Version	Creator	Description
1.0	Philipp Shilov	First version

# MAIN FEATURES

Fast and easy to setup.

Require minimal system resources.

Does not require 3rd party software to run.

VM and BM compatible.

The Inventory utility provides following information:

- Server hardware parts report (CPU, RAM, HDD, PCI boards)
- Server Serial Numbers report (Server MB, Storage, Fiber Switches, Tape Libs)
- Server Firmware versions (BIOS, UEFI, NIC, POWER servers)
- OS information (Score version, architecture type, Linux kernel, AIX OS Level)
- HDD and SSD Smart status (HDD & SSD health)
- Linux drivers versions for critical components (NIC modules)
- Server uptime, Limits, MEM Pages and TZ settings
- Running C1 and 3rd party applications version (CBS apps, UPA, Oracle, Java, WebLogic)
- Advanced Storage report (for EMC CX, DATA Domain, IBM v7000 and IBM fs900)
- Advanced FCS report (CISCO Nexus)
- Core Network switches inventory (Juniper and Cisco switches)
- Servers Network configuration snapshot (AIX and Linux. MAC, IP, Routing, VIP)

# USAGE

## PREREQUISITES

- Require **Bash 3** version or higher on the host server (**bash --version**)
- The **/etc/hosts** file on the host server should be reviewed before the first run
- **SSH password-less access** needs be configured across all UNIX servers (Linux and AIX). If this configuration is missed the utility will ask for the password for every server where no ssh certificates is present
- For IBM v7000 and fs900 storages, ssh password-less access needs to be present on SDP\_A node to both storage enclosures(active and stby.). This is default configuration.
- The Hardware Inventory tool support **any Linux or AIX versions** on the remote servers by default. However, Site specific configuration should be done for **audit.run** script.  
At the moment HW Inventory tool officially supports **UCELL** and all **VEON (Russia + CIS)** Production sites only.

## INSTALLATION

1. Unzip the file **HW\_AU.UCELL.v.1.0.tgz** to any convenient location of host server (UPM/OAM/MSM/Linux TRM).
2. Change files permissions to +x (**chmod +x \***)

## PREPARATION

1. The **/etc/hosts** file on the host server should be ready to run inventory, as it takes servers list from the host server **/etc/hosts** file.

The scripts uses special filters to avoid running inventory on the same host several times. As addition cause you can add special filter to exclude not necessary servers from the inventory list by adding the line **#audit\_exclude** for every **/etc/hosts** server record.

For example:

```
VIP_DR:oam1a:/root# grep audit_exclude /etc/hosts
10.31.189.112    upmdb upmdb_vip #audit_exclude
10.31.189.112    EM_REPOSITORY  orac-upmdb upmdb #audit_exclude
```

## FOR BASIC INVENTORY - skip preparation for IBM Storages and CISCO FCSs

2. For **IBM v7000** add san\_console information into the SDP **/etc/hosts** (both nodes):

```
DR-SDP1a:sdp1:/# grep -i san /etc/hosts
10.31.184.125 san_console
10.31.184.138 v7000-1a san1
10.31.184.139 v7000-1b san2
```

The **san\_console** is an IBM storage enclosures VIP interface. Which can be obtained from the storage active enclosure node (password-less access setup for SDP\_A only):

```
DR-SDP1a:sdp1:/# ssh superuser@san_console lssystem | grep console
console_IP 10.31.184.125:443
DR-SDP1a:sdp1:/#
```

3. For **IBM fs900** add `san_console_flash` information into the SDP `/etc/hosts` (both nodes):

```
Central-SDP23:sdp1:/# grep -i san_console /etc/hosts
192.168.89.39 san_storage-23 san1 san_console
192.168.89.45 san_flash-23 san2 san_console_flash
Central-SDP23:sdp1:/#
```

The `san_console_flash` is an IBM flash storage enclosures VIP interface. This information can be obtained from the storage active node enclosure (console password-less access setup for SDP\_A only by default):

```
Central-SDP23:sdp1:/# ssh superuser@san_console_flash lssystem | grep console
console_IP 192.168.89.45:443
Central-SDP23:sdp1:/#
```

4. Beware that **to some POWER8 SDPs both type of the storages** (v7000 and fs900) can be connected to one SDP server (different VGs are located on different storages). Be sure that you have both `san_console` and `san_console_flash` IP addresses in `/etc/hosts` file on both SDP\_A and SDP\_B nodes for this type of servers.
5. Double check that SDP\_A `known_hosts` file contains records for new `san_console` and `san_console_flash` hosts:

```
CEN-SDP23a:sdp1:/# ssh superuser@san_console 'lssystem'| grep code_level
code_level 7.8.1.10 (build 135.9.1905291321000)
```

```
CEN-SDP23a:sdp1:/# ssh superuser@san_console_flash 'lssystem'| grep code_level
code_level 7.8.1.10 (build 135.9.1905291321000)
CEN-SDP23a:sdp1:/#
```

6. For **CISCO FCS** (Nexus modules only) create special inventory user and configure password-less access for SDP\_A node on fcswa and fcswb FCSs:

```
Central-SDP23:sdp1:/# grep -i fcsw /etc/hosts
192.168.89.57 fc-sw23a fcswa fcs23a
192.168.89.58 fc-sw23b fcswb fcs23b
Central-SDP23:sdp1:/#
```

Login from **SDP\_A** node to **fcswa** as **admin** user and list all connected users to define correct SDP\_A IP address:

```
FCS-23A# show users
NAME      LINE      TIME      IDLE      PID COMMENT
audit     pts/0      Jan 21 20:37  .        6669 (192.168.89.56) session=ssh *
FCS-23A#
```

Copy SDP\_A RSA certificate to fcswa node (use IP defined on previous step):

```
FCS-23A# copy sftp://root@192.168.89.56/.ssh/id_rsa.pub id_rsa.pub
```

Confirm **certificate** now exists on CISCO **bootflash** device:

```
FCS-23A# dir
...
391      Mar 20 17:27:44 2019  id_rsa.pub
...
FCS-23A#
```

Create new **audit** user with reduced access permissions and stick RSA certificate to it:

```
FCS-23A# conf t
FCS-23A(config)# username audit password Incom9() role network-operator
```



```
FCS-23A(config)# username audit sshkey file bootflash:id_rsa.pub
FCS-23A(config)# end
FCS-23A#
```

Confirm new user has been created with reduced permissions role and RSA certificate:

```
FCS-23A# show user-account audit
user:audit
      this user account has no expiry date
      roles:network-operator
      ssh public key: ssh-rsa AAAAB3NzaC1yc2EAAAADAQABAAQACxwFUEqKCuvQiSE0
ogU2oNplgN9caBmOUOQ556zD4PLzGS5SzBlah-Blah-Blah...
FCS-23A#
```

Save new CISCO configuration:

```
FCS-23A# copy run start
# [#####] 100%
# Copy complete.
FCS-23A# exit
```

**Perform the same steps** for **SDP\_A** but from **fcswb** (the second) switch.

Confirm password-less access is configured for both **fcswa** and **fcswb** switches from SDP\_A node:

```
sdp23a:/# ssh -q audit@fcswa 'sh inventory' | head -1 | awk '{print $4,$5}';
MDS 9148S
sdp23a:/# ssh -q audit@fcswb 'sh inventory' | head -1 | awk '{print $4,$5}';
MDS 9148S
sdp23a:/#
```

## FULL SITE INVENTORY

To run hardware inventory across all the onsite servers you have to execute **audit.run** script as superuser with short site name:

```
COSCOM-UPM1a:upm1:# ./audit.run UCELL
```

Keep an eye on the progress. Human input might be required.

Running HW Inventory on following units:

SGU, DGU, SLU, DSLU, CRMOMAPP, ... CMVOEM, UPM, UPMDB, OAMAPP, SDP, CPM, WPDB, BF, ADMIN

PROGRESS: 70% [#####.....] RUNNING ON: UPM&DB

For help information - fire **audit.run** without any keys:

```
COSCOM-UPM1a:upm1:# ./audit.run
```

Runs Hardware Inventory checks across all onsite units.

**Usage:** `./audit.run SITE_ID`

Where SITE\_ID is short site name. AIX and LINUX inventory scripts will be updated with this short name on first audit.run execution.

Examples:

```
./audit.run UCELL
```

```
./audit.run UCELL_PROD
```

```
./audit.run UCELL_TEST
```

Prerequisites:

`aix_hw_au.sh` - runs Hardware Inventory checks against any AIX-based servers.

`linux_hw_au.sh` - runs Hardware Inventory checks against any Linux-based servers.

Be aware that SANbox and EMCds FCSS checks is deprecated in this version, as obsolete HW

```
COSCOM-UPM1a:upm1:#
```

As a result of this execution you'll have two **.CSV** files. First with Linux based servers inventory, second with AIX based servers inventory information:

```
COSCOM-UPM1a:upm1:# ls -rlt
-rwxrwxrwx 1 root root 5319 Jan 21 19:40 audit.run
-rwxrwxrwx 1 root root 15880 Jan 21 21:32 linux_hw_au.sh
-rwxrwxrwx 1 root root 12436 Jan 21 21:32 aix_hw_au.sh
-rw-r--r-- 1 root root 87596 Jan 21 21:43 UCELL.LINUX_HW_LIST.csv
-rw-r--r-- 1 root root 20161 Jan 21 21:47 UCELL.AIX_HW_LIST.csv
COSCOM-UPM1a:upm1:#
```

Both CSV files will contain all the inventory data with pipe (|) symbol used as the columns delimiter:

```
COSCOM-UPM1a:upm1:# head -2 YAR.LINUX_HW_LIST.csv
SITE |HOSTNAME |IP ADDR |ROUTE |HW TYPE |HW SN |LNX SCORE |KERNEL |HW ARCH |APP
VERSION |APP INSTALL DATE(M/D/Y) |UP VERSION |ORA CLI |ORA DB |TT DB |WL VERSION |JAVA
VER |RAM |CORES |THREADS |ENA CORES |CPU |HDD SIZE |HDD MODEL |HDD HEALTH |ACTIVE UEFI
BANK |UEFI/BIOS VERSION |FILE-MAX (sysctl.conf) |FILE-LIMIT (ulimit -n)|UPTIME |NIC
DRVs |EMC MODEL |EMC SERIAL |EMC FLARE |V7k MODEL |V7k TYPE |V7k ENCLOSURE SN |v7K FW
|V7k failed HDDs |V7k CONSOLE |DD MODEL |DD SERIAL |DD OS |DD DISK STATUS |DD UPTIME
YAR |sgula |10.31.184.100 |10.31.184.1 |ProLiant BL460c Gen8 |CZJ34204BT |6.2.1 |
2.6.32-220.el6.i686 |i686 |7.0.5 | Mon Apr 10 2017 |4.120.0 |11.2.0.3.0 |NA |NA |NA |
1.6.0_31 |3983136 |6 |12 |6 |E5-2620Xeon(R) |300.0GB |HP LOGICAL VOLUME |OK |HP NA |
1.51 | 20000 |8192 |327 days |2.1.11 2.7.0.3 1.70.00-0 |NA |NA |NA |NA |NA |NA |NA |NA
|NA |NA |NA |NA |NA |
COSCOM-UPM1a:upm1:#
```

## LINUX HOSTS INVENTORY

To run Hardware Inventory checks against any Linux-based servers you have to execute **linux\_hw\_au.sh** script.

For help information, run **linux\_hw\_au.sh** without any keys:

```
COSCOM-UPM1a:upm1:# ./linux_hw_au.sh
```

Runs Hardware Inventory checks against any Linux-based servers.

**Usage:** `./linux_hw_au.sh HOSTNAME SITE_ID`

Where:

HOSTNAME is server to run inventory on or mask for the group of hosts from the /etc/hosts

SITE\_ID is optional parameter, will be inserted as first column of output. PROD\_SITE is used by default

Examples:

```
./linux_hw_au.sh sgu21b UCELL
```

```
./linux_hw_au.sh slu UCELL_PROD
```

```
./linux_hw_au.sh sgu23
```

```
COSCOM-UPM1a:upm1:#
```

Once you read all the help, you can execute **linux\_hw\_au.sh** script as superuser.

Beware the script will not save any data to .CSV files, it will send all the output, about every server to console:

```
COSCOM-UPM1a:upm1:# ./linux_hw_au.sh sgu3 UCELL
```

```
SITE |HOSTNAME |IP ADDR |ROUTE |HW TYPE |HW SN |LNK SCORE |KERNEL |HW ARCH |APP VERSION |APP INSTALL DATE(M/D/Y) |UP
VERSION |ORA CLI |ORA DB |TT DB |WL VERSION |JAVA VER |RAM |CORES |THREADS |ENA CORES |CPU |HDD SIZE |HDD MODEL |HDD
HEALTH |ACTIVE UEFI BANK |UEFI/BIOS VERSION |FILE-MAX (sysctl.conf) |FILE-LIMIT (ulimit -n)|UPTIME |NIC DRVs |EMC
```

```

MODEL |EMC SERIAL |EMC FLARE |V7k MODEL |V7k TYPE |V7k ENCLOSURE SN |v7K FW |V7k failed HDDs |V7k CONSOLE |DD MODEL
|DD SERIAL |DD OS |DD DISK STATUS |DD UPTIME

UCELL |sgu3a |192.168.30.1 |10.4.18.1 |DPM3 PFS-379/380 |See IPMI FRU |5.4 |2.6.18-164.2.1.el5PAE |i686 |6.0.2 | Thu
Dec 15 2011 |4.100.0 |10.2.0.3.0 |10.2.0.3.0 |NA |NA |1.4.2 |4019116 |2 |2 |NA |T7400Core(TM)2 |120.0GB | |NA |DPM3
NA |1.00.08 |8192 |8192 |1155 days |1.9.3 2.0.1e 1.48.105 |NA |NA |NA |NA |NA |NA |NA |NA |NA |NA |NA |NA |
UCELL |sgu3b |192.168.30.2 |10.4.18.1 |DPM3 PFS-379/380 |See IPMI FRU |5.4 |2.6.18-164.2.1.el5PAE |i686 |6.0.2 | Thu
Dec 15 2011 |4.100.0 |10.2.0.3.0 |10.2.0.3.0 |NA |NA |1.4.2 |4019116 |2 |2 |NA |T7400Core(TM)2 |120.0GB | |NA |DPM3
NA |1.00.08 |8192 |8192 |233 days |1.9.3 2.0.1e 1.48.105 |NA |NA |NA |NA |NA |NA |NA |NA |NA |NA |NA |NA |

```

You can print necessary inventory data only:

```

COSCOM-UPM1a:upm1:# ./linux_hw_au.sh urp | awk -F '|' '{print $2|" "$5|" "$6}'
HOSTNAME |HW TYPE |HW SN
urp1 |IBM eServer BladeCenter |99HD013
urp2 |IBM eServer BladeCenter |99KC603
urp3 |DPM3 PFS-379/380 |See IPMI FRU
COSCOM-UPM1a:upm1:#

```

Or forward output into the file for further analysis:

```

CSCOM-UPM1a:upm1:# ./linux_hw_au.sh dslu UCELL > UCELL.LINUX.`date +%d.%m.%Y` .csv
CSCOM-UPM1a:upm1:# ls -lrt *.csv
-rw-r--r-- 1 root root 6310 Jan 20 22:36 UCELL.LINUX.20.01.2021.csv
COSCOM-UPM1a:upm1:# wc -l UCELL.LINUX.20.01.2021.csv
42 UCELL.LINUX.20.01.2021.csv
COSCOM-UPM1a:upm1:#

```

## AIX HOSTS INVENTORY

To run Hardware Inventory checks against any Linux-based servers you have to execute **aix\_hw\_au.sh** script.

For help information, run **aix\_hw\_au.sh** without any keys:

```
COSCOM-UPM1a:upm1:# ./aix_hw_au.sh
```

Runs Hardware Inventory checks against any AIX-based servers.

**Usage:** `./aix_hw_au.sh HOSTNAME SITE_ID`

Where:

HOSTNAME is server to run inventory on or mask for the group of hosts from the /etc/hosts

SITE\_ID is optional parameter, will be inserted as first column of output. PROD\_SITE is used by default

Examples:

```
./aix_hw_au.sh sdp1b UCELL
```

```
./aix_hw_au.sh sdp UCELL_PROD
```

```
./aix_hw_au.sh UCELL_TEST
```

```
COSCOM-UPM1a:upm1:#
```

Once you read all the help, you can execute **aix\_hw\_au.sh** script as superuser.

Beware the script will not save any data to .CSV files, it will send all the output, about every server to console:

```
COSCOM-UPM1a:upm1:# ./aix_hw_au.sh sdp1 UCELL
```

```
SITE |HOSTNAME |HW TYPE |SYSTEM MODEL |SERIAL |NGSCORE |DBCORE |ORACLE DB |ORACLE CLI |UP VERSION |JAVA VERSION |
FIRMWARE |AIX OS LEVEL |BLU MODEL |BLU SERIAL |NSR LICENSE EXP |NETWORKER VERSION |FCSWA MODEL |FCSWA SN |FCSWA FW
LEVEL |FCSWB MODEL |FCSWA SN |FCSWB FW LEVEL |EMC MODEL |EMC SERIAL |EMC FLARE |V7k MODEL |V7k TYPE |V7k ENCLOSURE
```

```
SN |v7K FW |V7k failed HDDs |V7k CONSOLE |V7k2F MODEL |V7k2F TYPE |V7k2F ENCLOSURE SN |v7K2F FW |V7k2F failed SSDs |
V7k2F CONSOLE |CLUST IP |NODE IP |HMC IP |LPAR INFO |AUTO RESTART |CPU CLOCK |NUM OF CPU |RAM SIZE |GOOD RAM SIZE |
NUM OF RAM MODULES |SIZE OF RAM MODULES(MB) |PAGE SIZE |COUNT ERRPT |UNIQ ERRPT |UPTIME |
```

```
UCELL |sdp1a |POWER8 |IBM,8284-22A |78D13BX |V7.2.4 |4.56.0 |11.2.0.4.191015 |Not installed |Not installed |not |
sys0!system:SV860_205 (t) SV860_205 (p) SV860_205 (t) |7200-03-03-1913 |IBMULT3580-HH7 |116B2DE05B |No Exp Date |NA
| | | | | |NA |NA |NA |NA |NA |NA |NA | 0 |NA |IBM FlashSystem 900 |control 9843-AE3 |13BG06X |1.6.1.0 |
0 |10.4.21.122:443 |10.4.19.138 | |NA|1 78-D13BX |true |3891 MHz |12 |253952 MB |253952 MB |8 |0032768 0032768
0032768 0032768 0032768 0032768 0032768 0032768 |s 4 KB m 64 KB |32 |1 |329days |
```

```
UCELL |sdp1b |POWER8 |IBM,8284-22A |78D13CX |V7.2.4 |Not there |11.2.0.4.191015 |Not installed |Not installed |not |
sys0!system:SV860_205 (t) SV860_205 (p) SV860_205 (t) |7200-03-03-1913 |IBMULT3580-HH7 |116B2DE05B |No Exp Date | |
same as on node A |same as on node A | |same as on node A |same as on node A | |NA |NA |NA |same as on node A |same
as on node A |same as on node A |same as on node A |same as on node A |same as on node A |same as on node A |same as
on node A |same as on node A |same as on node A |same as on node A |same as on node A |10.4.19.138 | |NA|1 78-D13CX
|true |3891 MHz |12 |253952 MB |253952 MB |8 |0032768 0032768 0032768 0032768 0032768 0032768 0032768 0032768 |s 4
KB m 64 KB |32 |1 |329days |
```

```
COSCOM-UPM1a:upm1:#
```

You can print necessary inventory data only:

```
upm1:# ./aix_hw_au.sh sdp | awk -F '|' '{print $2"|" $3"|" $4"|" $5"|" $6}'
```

```
HOSTNAME |HW TYPE |CPU CLOCK |NUM OF CPU |RAM SIZE
```

```
sdp1a |POWER8 |3891 MHz |12 |253952 MB
```

```
...
```

```
sdp9b |POWER8 |3891 MHz |6 |186624 MB
```

```
COSCOM-UPM1a:upm1:#
```

Or forward output into the file for further analysis:

```
COSCOM-UPM1a:upm1:# ./aix_hw_au.sh sdp UCELL > UCELL.AIX.`date +%d.%m.%Y`.csv
```

```
COSCOM-UPM1a:upm1:# ls -lrt *.csv
```

```
-rw-r--r-- 1 root root 6310 Jan 20 22:43 UCELL.AIX.20.01.2021.csv
```

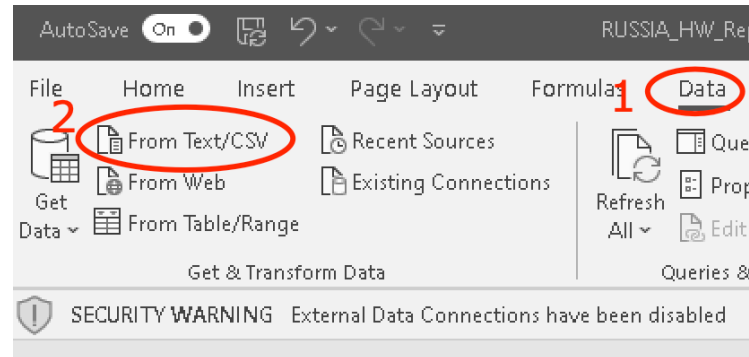
```
COSCOM-UPM1a:upm1:# wc -l UCELL.AIX.20.01.2021.csv
```

```
14 UCELL.AIX.20.01.2021.csv
```

```
COSCOM-UPM1a:upm1:#
```

## IMPORT .CSV Inventory file into EXCEL

To import Inventory data from your .CSV file open Excel and go to Data > From Text/CSV:



Choose your .CSV file and press “Open” - new window will appear.

In new window choose --Custom-- as a delimiter, from the list, enter pipe (|) in the field right below and then press “Load”.

The new Tab will be opened with your data.

KS\_Linux\_HW\_13.11.2020.txt

File Origin: 1252: Western European (Windows) | Delimiter: --Custom-- | Data Type Detection: Based on first 200 rows

2 |

SITE	HOSTNAME	IP ADDR	ROUTE	HW TYPE	HW SN	LNK SCORE	HW ARCH	OF
KYIVSTAR	sgu11a	10.0.20.73	172.18.200.1	BladeCenter HS22-[7870Z34]-	06NYZR4	6.2.1	i686	11
KYIVSTAR	sgu11b	10.0.21.73	172.18.200.1	BladeCenter HS22-[7870Z34]-	06NYZV8	6.2.1	i686	11



## KNOWN ISSUES

For **UCELL Production** site:

- Navicli utility throw timeout exception on both UPM1 and UPM2 nodes, hence it is not possible to verify attached EMC CX300 storage library. The **audit.run** will throw following errors due to this issue, you may ignore it until storage will be fixed:

```
COSCOM-UPM1a:upm1:/root/1223/hw_au# ./audit.run UCELL
Keep an eye on the progress. Human input might be required.
Running HW Inventory on following units:
SGU, DGU, SLU, DSLU, ECI, NOTIF, ORP, URP, SAPI, RHT ... CMVOEM, UPM, UPMDB, OAMAPP, CPM, WPDB, BF, ADMIN
bash: line 67: 13291 Terminated tmt 9 5 /opt/Nav/bin/navicli -h emc1 getagent > /tmp/navi_ag.txt 2> /dev/null
bash: line 67: 21064 Terminated tmt 9 5 /opt/Nav/bin/navicli -h emc1 getagent > /tmp/navi_ag.txt 2> /dev/null
COMPLETED 100% [#####] 22:12:33 21.01.2021
```

- Some IBM v7000 storages were deployed with **non standard passwords** and without valid SSH keys on SDP\_A node of AIX servers. As reason **aix\_hw\_au.sh** script can't get access to those storages
- **CISCO MDS FCSs** don't have valid ssh certificates and **Audit** user was not created for password-less access. To be honest, I was too lazy to do it, but let's keep it in secret, anyway nobody will read this. You can fix it in anytime btw
- File **/etc/hosts** located on UPM1 and UPM2 is outdated and contains lot of Zabbix servers sits behind the SAPI or AJMS IPs
- There are lot of old **DPM3** servers which are not handling production traffic and can be powered off