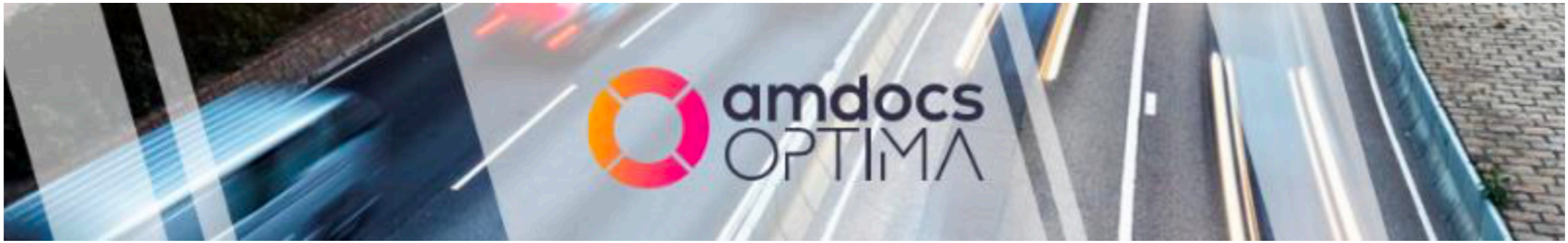

Hardware Inventory tool

For C1 RT KARTEL System

amdocs OPTIMA

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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 **KARTEL** and all **VEON (Russia + CIS)** Production sites only.

INSTALLATION

1. Unzip the file **HW_AU.KARTEL.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 KARTEL PROD SITE ALL PREPARATIONS HAS BEEN ALREADY DONE!

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 AAAAB3NzaC1yc2EAAAADAQABAAABAQCxFUEqKCuvQiSE0
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:

```
Kartel:[root@upm1 hw_au]# ./audit.run KARTEL
 Keep an eye on the progress. Human input might be required.

 Running HW Inventory on following units:

 SGU, SLU, OSA, ECI, NOTIF, OFR, SAPI, AJMS, FEADMIN, UPM/OAM, UPMDB, BACKUP-GW, SDP

 PROGRESS: 50% [##########################.........................] RUNNING ON: SAPI
```

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

```
Kartel:[root@upm1 hw_au]# ./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 KARTEL
    ./audit.run KARTEL_PROD
    ./audit.run KARTEL_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

Kartel:[root@upm1 hw_au]#
```

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:

```
Kartel:[root@upm1 hw_au]# 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 42245 Jan 27 00:10 KARTEL.LINUX_HW_LIST.csv
-rw-r--r-- 1 root root  9700 Jan 27 00:16 KARTEL.AIX_HW_LIST.csv
Kartel:[root@upm1 hw_au]#
```

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

```
Kartel:[root@upm1 hw_au]# head -2 KARTEL.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
KARTEL |sgu1a |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 |
Kartel:[root@upm1 hw_au]#
```


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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:

```
Kartel:[root@upm1 hw_au]# ./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 KARTEL

    ./linux_hw_au.sh slu KARTEL_PROD

    ./linux_hw_au.sh sgu23

Kartel:[root@upm1 hw_au]#
```

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:

```
Kartel:[root@upm1 hw_au]# ./linux_hw_au.sh sgu3 KARTEL

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

KARTEL |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 |

KARTEL |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:

```
Kartel:[root@upm1 hw_au]# ./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

Kartel:[root@upm1 hw_au]#
```

Or forward output into the file for further analysis:

```
Katel:[upm1]# ./linux_hw_au.sh dslu KARTEL > KARTEL.LINUX.`date +'%d.%m.%Y'`.csv
Katel:[root@upm1]# ls -lrt *.csv
-rw-r--r-- 1 root root  6310 Jan 20 22:36 KARTEL.LINUX.20.01.2021.csv
Kartel:[root@upm1]# wc -l KARTEL.LINUX.20.01.2021.csv
42 KARTEL.LINUX.20.01.2021.csv
Kartel:[root@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:

```
Kartel:[root@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 KARTEL

    ./aix_hw_au.sh sdp KARTEL_PROD

    ./aix_hw_au.sh KARTEL_TEST

Kartel:[root@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:

```
Kartel:[root@upm1]# ./aix_hw_au.sh sdp1 KARTEL

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 |

KARTEL |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 |

KARTEL |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 |

Kartel:[root@upm1]#
```

You can print necessary inventory data only:

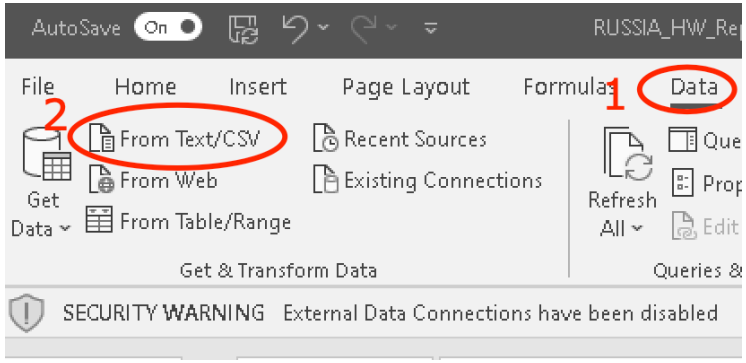
```
upm1:# ./aix_hw_au.sh sdp | awk -F '|' '{print $2"|"$3"|"$44"|"$45"|"$46}'
HOSTNAME |HW TYPE |CPU CLOCK |NUM OF CPU |RAM SIZE
sdp1a |POWER8 |3891 MHz |12 |253952 MB
...
sdp9b |POWER8 |3891 MHz |6 |186624 MB

Kartel:[root@upm1]#
```

Or forward output into the file for further analysis:

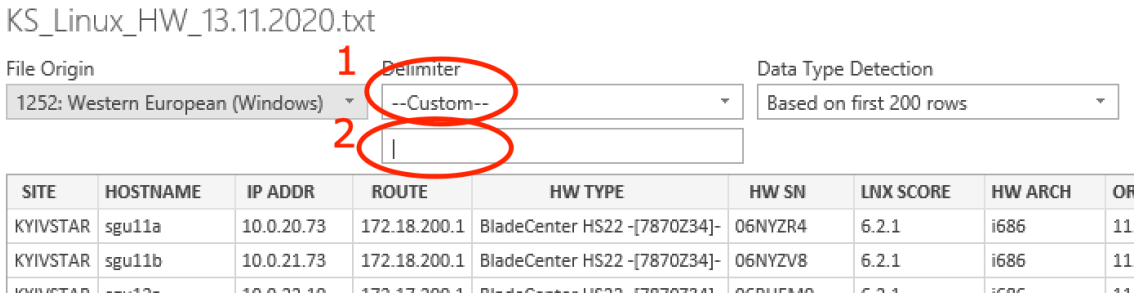
```
Kartel:[root@upm1]# ./aix_hw_au.sh sdp KARTEL > KARTEL.AIX.`date +'%d.%m.%Y'`.csv
Kartel:[root@upm1]# ls -lrt *.csv
-rw-r--r-- 1 root root  6310 Jan 20 22:43 KARTEL.AIX.20.01.2021.csv
Kartel:[root@upm1]# wc -l KARTEL.AIX.20.01.2021.csv
14 KARTEL.AIX.20.01.2021.csv
Kartel:[root@upm1]#
```

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.



KNOWN ISSUES

For **KARTEL Production** site:

- When run linux inventory for **UPMDB** servers, **DataDomain** checks returns blank output. This is normal situation as **KarTel** UPMDB solution has new design and shipped with **NAS/ BACKUP-GW** servers which has **IBM v7k** and **IBM v5k** storages instead of EMC DataDomain. However DataDomain checks left for **backward compatibility** with other sites, so you have to ignore it.