TXT Provisioning Guide

OS: Ubuntu 11.10

VMM: XEN

IASI

CLOUD SOLUTIONS ENGINEERING

Contents

INTEL CONFIDENTIAL

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Introduction

This document is intended to be used by Datacenter architects and developers designing solutions to extend the functionality of the Intel TXT. This document focuses on methodology and approaches with the step by step instructions to build the TXT test bed from linear perspective.

System Hardware Requirements

Processor	Starting X5600 Processor codename: Westmere-EP
Chipset	Starting Intel® 5520 Chipset (codename: Tylersburg)
TPM Chip	v 1.1
RAM	Minimum 12 Gig
HDD	Minimum 60 Gig

System Software Requirements

BIOS f/w	TXT Supported BIOS. Refer appendix for more detail on OEM bios
SINIT ACM	http://software.intel.com/en-us/articles/intel-trusted-execution-technology/
Tboot file	http://sourceforge.net/projects/tboot/
kvm	http://www.linux-kvm.org/page/Main_Page
TCG Software Stack	*http://sourceforge.net/projects/trousers*

SECTION -I

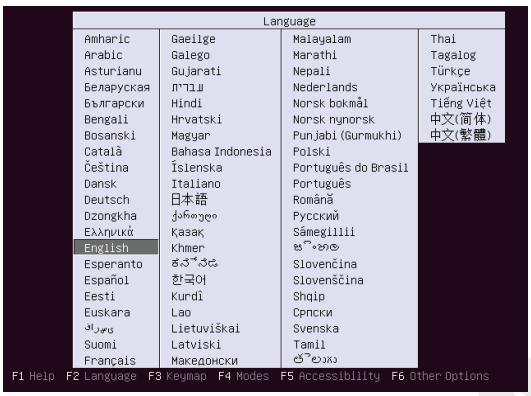
1.1 TXT/TPM Provisioning in BIOS setup

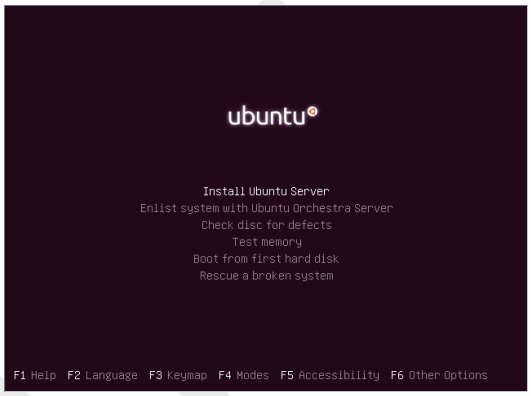
INTEL EPSD 1625UR	DELL Power Edge R710	HP DL380G7
Press F2 key to enter in to BIOS console	Press F2 key to enter in to BIOS console	Press F9 key to enter in to BIOS console
Setup BIOS password *(Security > Set Administrator Password)*	Setup BIOS password. *(System Security > Password Status> locked)* *(System Security > System Password > Enabled)* *(System Security > Setup Password)*	Set the BIOS password *(System Security > Set Admin Password)*
Press F10 key twice to reboot the server	Press ESC key twice and select "save changes and exit"	Enable TPM *(System Security > Trusted Platform Module > TPM Functionality > Enabled)*
On Boot, press F2 and enter the BIOS password	On Boot, press F2 and enter the BIOS password	Enable TXT *(System Security >Intel TXT support > Enabled)*
Ensure VT/VT-d is enabled *(Advanced >Processor Configuration >Enable VT)*	Enable TPM *(System Security >TPM security >On with Pre-boot Measurement)* *(System Security >TPM activation> Activate)*	Press ESC key twice and Press F10 to "save changes and exit" to reboot the server
Ensure VT-d is enabled *(Advanced >Processor Configuration >Enable VT-d)*	Press ESC key twice and select "save changes and exit"	
Enable TPM *(Security >TPM Admin Control > Turn ON)*	On Boot, press F2 and enter the BIOS password	
Enable TXT *(Advanced > Processor Configuration > TXT)*	Enable TXT *(System Security >Intel TXT> Enabled)*	
Press F10 key twice to save and reboot the server	Press ESC key twice and select "save changes and exit" to reboot the server	

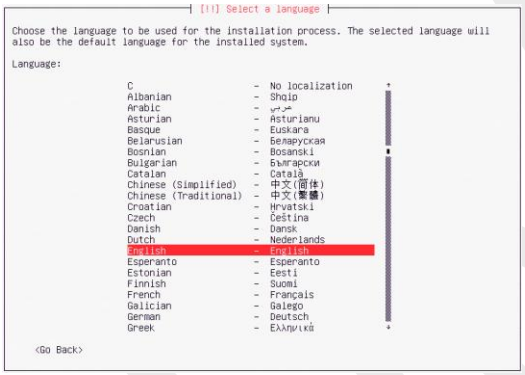
1.2 OS installation – Ubuntu 11.10

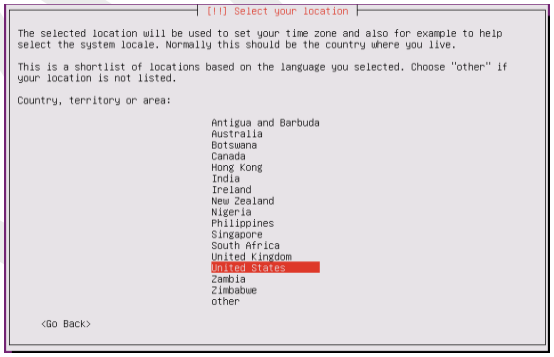
In this document we have covered the installation of Ubuntu 11.10 ***Codename: oneiric*** and ***Kernel ver: 3.0.0-12-server***. Below steps will walkthrough OS installation/configuration with screenshot.

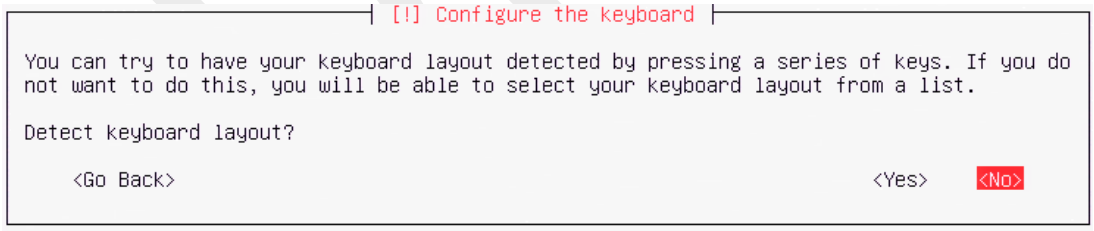
Step 1:

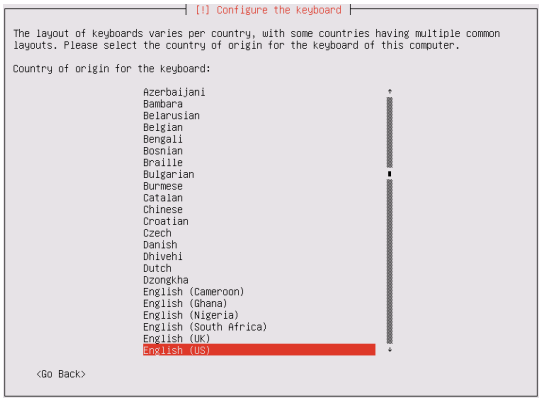


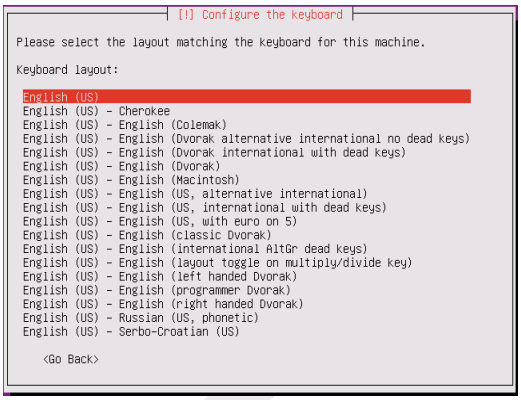


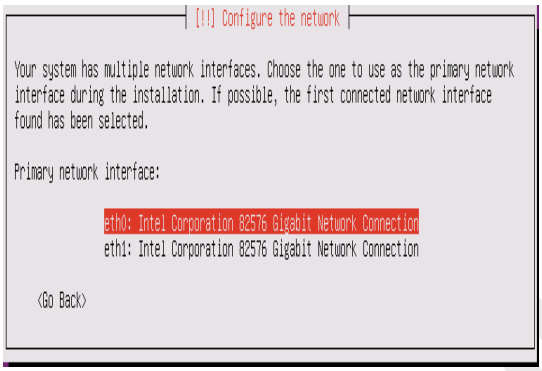


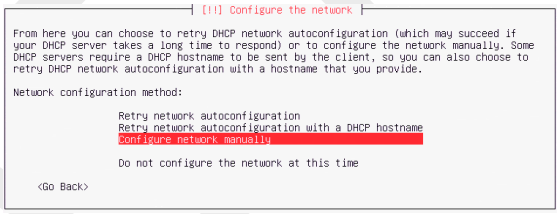




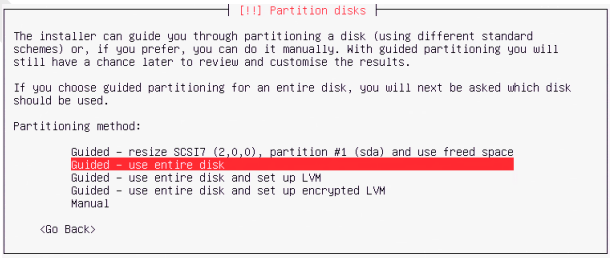


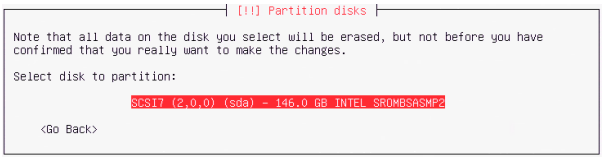


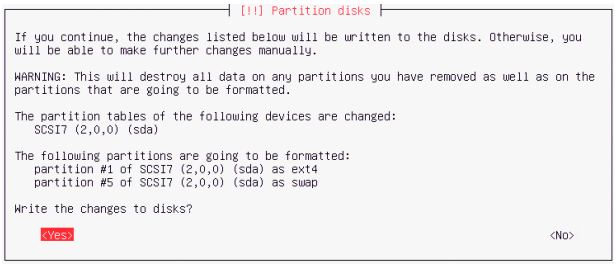


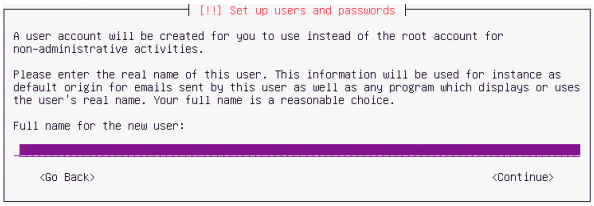


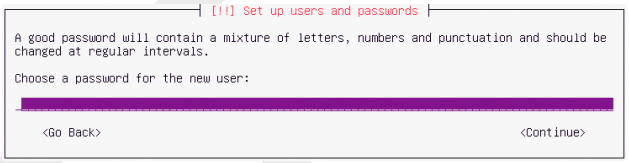
Note: Will be prompted to enter the network configuration

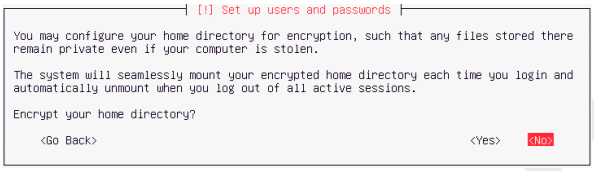


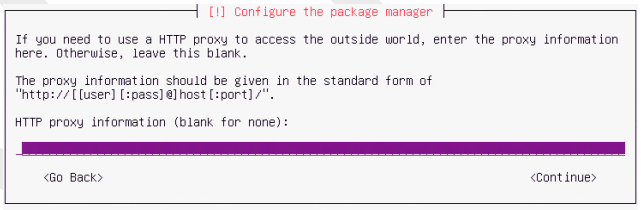




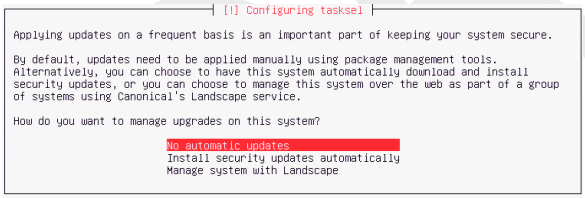


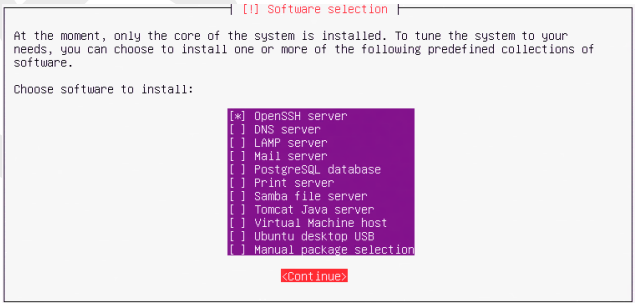


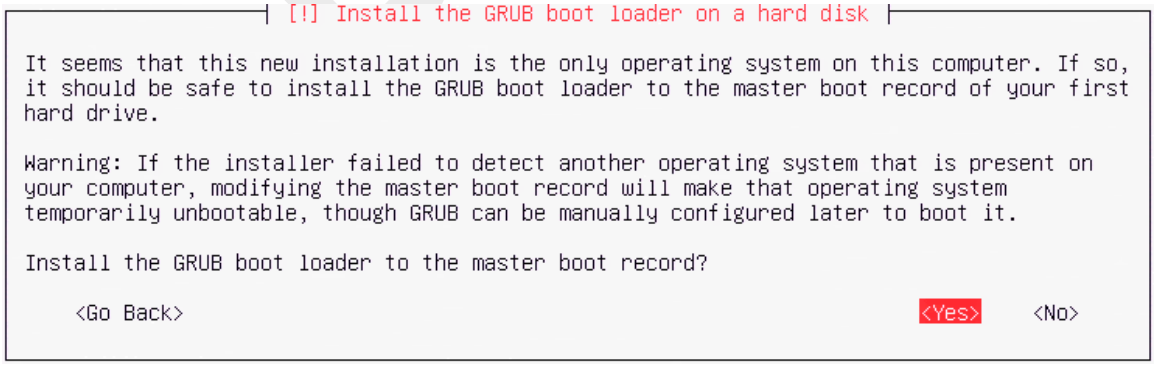


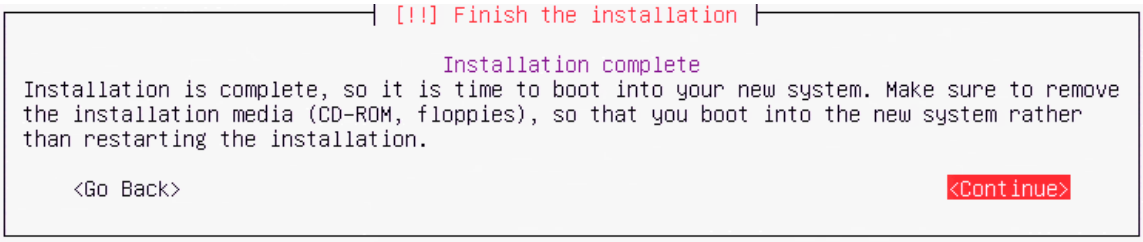


Note: Enter the proxy setting if needed.









Once the installation of the OS is complete, accept the prompt to reboot the computer.

1.3 OS configuration:

1. Login as user

```
administrator@ubuntu01: $ sudo su -
[sudo] password for administrator:
root@ubuntu01:~#
```

2. Remove the "!" from the file "/etc/shadow"

```
root@ubuntu01: # cat /etc/shadow
root:!:15358:0:99999:7:::
daemon:*:15358:0:99999:7:::
bin:*:15358:0:99999:7:::
sys:*:15358:0:99999:7:::
sync:*:15358:0:99999:7:::
games:*:15358:0:99999:7:::
man:*:15358:0:99999:7:::
lp:*:15358:0:99999:7:::
mail:*:15358:0:99999:7:::
news:*:15358:0:99999:7:::
uucp:*:15358:0:99999:7:::
proxy:*:15358:0:99999:7:::
www-data:*:15358:0:99999:7:::
```

Remove the "!" from the file "/etc/shadow"

3. Enable Root user and set the Root password:

$ sudo passwd root

```
root@ubuntu01:~# passwd root
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
root@ubuntu01:~#
```

1.4 VMM Installation:

1. Install the Xen hypervisor

$ apt-get install xen-hypervisor-4.1-amd64
$ apt-get install xenwatch
$ apt-get install xen-utils-common
$ apt-get install xenstore-utils
$ apt-get install xen-utils-4.1
$ apt-get install gcc-multilib xz-utils
$ apt-get install bcc
$ apt-get install virtinst virt-viewer virt-manager

2. Verify that Xen is running correctly

$ xl list

```
root@mwtstubx01h:~# xl list
Name                                        ID   Mem VCPUs      State   Time(s)
Domain-0                                     0  1024     1     r-----      34.8
```

$ xm info | more

```
root@mwtstubx01h:~# xm info | more
host                   : mwtstubx01h
release                : 3.0.0-12-server
version                : #20-Ubuntu SMP Fri Oct 7 16:36:30 UTC 2011
machine                : x86_64
nr_cpus                : 24
nr_nodes               : 2
cores_per_socket       : 6
threads_per_core       : 2
cpu_mhz                : 3325
hw_caps                : bfebfbff:2c100800:00000000:00003f40:029ee3ff:00000000:0
0000001:00000000
virt_caps              : hvm hvm_directio
total_memory           : 12222
free_memory            : 11028
free_cpus              : 0
xen_major              : 4
xen_minor              : 1
xen_extra              : .1
xen_caps               : xen-3.0-x86_64 xen-3.0-x86_32p hvm-3.0-x86_32 hvm-3.0-x
86_32p hvm-3.0-x86_64
xen_scheduler          : credit
xen_pagesize           : 4096
platform_params        : virt_start=0xffff800000000000
```

3. Configure the installation of XEN by edit the xend-config.sxp. Backup your xend-config.sxp before make changes to the xend-config.sxp

```
root@mwtstubx01h:/etc/xen# cp xend-config.sxp xend-config.sxp.old
```

Edit the /etc/xen/xend-config.sxp file with below info:

$ vi /etc/xen/xend-config.sxp

i) Remove the comment

```
(logfile /var/log/xen/xend.log)
(loglevel DEBUG)
```

ii) Remove the comment for XEN API settings and set to yes

```
(xend-unix-server yes)
```

iii) Add Network bridge and virtual interface scripts to xend.config.sxp and Save

```
(network-script network-bridge netdev=eth0)
(network-script /bin/true)
```

Edit your .bashrc file and add the line below. Save the file and then reboot

```
root@mwtstubx01h:~# cd /root
root@mwtstubx01h:~# vi .bashrc
export VIRSH_DEFAULT_CONNECT_URI="xen:///"
```

After rebooted the server, confirm if you can connect to your Xen server using virsh command

```
root@mwtstubx01h:~# virsh version
Compiled against library: libvir 0.9.2
Using library: libvir 0.9.2
Using API: Xen 3.0.1
Running hypervisor: Xen 4.1.0
```

SECTION -II

1.1 Grub configuration/installation

By default Ubuntu 11.10 installs the "grub2" boot loader. "GRUB2" will boot directly to the login prompt or Desktop. No menu will be displayed and there is no /boot/grub/menu.lst file. In order to edit the grub file, the user will need to downgrade from the default "grub2" to the older "grub" boot loader.

Perform the following steps to uninstall "grub2" and install "grub."

1. Login as root user, and copy the existing grub folder to a backup.

```
$ cp /etc/default/grub /etc/default/grub.old
$ cp -R /etc/grub.d /etc/grub.d.old
$ cp -R /boot/grub /boot/grub.old
```

2. Remove the "grub2" boot loader

```
$ apt-get purge grub2 grub-pc
```

- Tab to "yes" when prompted

3. Install the downgraded "grub" boot loader

```
$ apt-get install grub
```

4. Determine the mount point of the boot loader

```
$ mount
```

```
administrator@ubuntu01:/boot/grub$ mount
/dev/sda1 on / type ext4 (rw,errors=remount-ro)
proc on /proc type proc (rw,noexec,nosuid,nodev)
sysfs on /sys type sysfs (rw,noexec,nosuid,nodev)
fusectl on /sys/fs/fuse/connections type fusectl (rw)
none on /sys/kernel/debug type debugfs (rw)
none on /sys/kernel/security type securityfs (rw)
udev on /dev type devtmpfs (rw,mode=0755)
devpts on /dev/pts type devpts (rw,noexec,nosuid,gid=5,mode=0620)
tmpfs on /run type tmpfs (rw,noexec,nosuid,size=10%,mode=0755)
none on /run/lock type tmpfs (rw,noexec,nosuid,nodev,size=5242880)
none on /run/shm type tmpfs (rw,nosuid,nodev)
administrator@ubuntu01:/boot/grub$
```

5. Write the “grub” boot loader to the appropriate mount point

$ *grub-install /dev/sda* Choose the correct device as marked in above snapshot. Ensure it creates the stage1 & stage2 files in /boot/grub and writes to the MBR.

```
root@mwtstubk01h:~# grub-install /dev/sda1
Searching for GRUB installation directory ... found: /boot/grub
Installing GRUB to /dev/sda1 as (hd0,0)...
Installation finished. No error reported.
This is the contents of the device map /boot/grub/device.map.
Check if this is correct or not. If any of the lines is incorrect,
fix it and re-run the script `grub-install'.

(fd0)   /dev/fd0
(hd0)   /dev/sda
```

6. Run the “update-grub” command to generate the “menu.lst” file

$ *update-grub* ▪ Tab to “yes” when prompted

7. Reboot the server

$ *reboot*

1.2 GRUB File Modification

1) Edit the new grub file “/boot/grub/menu.lst” as shown in the below screenshots

$ *vim /boot/grub/menu.lst*

By default, the menu.lst file will look like this:

```
## ## End Default Options ##

title           Ubuntu 11.10, kernel 3.0.0-12-server
uuid            9b19713b-fac3-4232-98b9-09d988960eac
kernel          /boot/vmlinuz-3.0.0-12-server root=UUID=9b19713b-fac3-4232-98b9-09d988960eac ro quiet splash
initrd          /boot/initrd.img-3.0.0-12-server
quiet

title           Ubuntu 11.10, kernel 3.0.0-12-server (recovery mode)
uuid            9b19713b-fac3-4232-98b9-09d988960eac
kernel          /boot/vmlinuz-3.0.0-12-server root=UUID=9b19713b-fac3-4232-98b9-09d988960eac ro  single
initrd          /boot/initrd.img-3.0.0-12-server

title           Ubuntu 11.10, memtest86+
uuid            9b19713b-fac3-4232-98b9-09d988960eac
kernel          /boot/memtest86+.bin
quiet
```

2) Change the timeout to > 5

```
# You can specify 'saved' instead of a number. In this case, the default entry
# is the entry saved with the command 'savedefault'.
# WARNING: If you are using dmraid do not use 'savedefault' or your
# array will desync and will not let you boot your system.
default         0

## timeout sec
# Set a timeout, in SEC seconds, before automatically booting the default entry
# (normally the first entry defined).
timeout         10
```

3) Save and Reboot the server to verify that the changes are being reflected.

```
$ reboot
```

SECTION -III

1.1 Tboot installation

1. Login as root user and install tboot.

```
$ apt-get install tboot
```

```
root@ubuntu01:~# apt-get install tboot
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  libtspi1
The following NEW packages will be installed:
  libtspi1 tboot
0 upgraded, 2 newly installed, 0 to remove and 50 not upgraded.
Need to get 479 kB of archives.
After this operation, 1,241 kB of additional disk space will be used.
Do you want to continue [Y/n]? y
Get:1 http://us.archive.ubuntu.com/ubuntu/ oneiric/main libtspi1 amd64 0.3.5-4 [178 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu/ oneiric/universe tboot amd64 1.6-0ubuntu1 [301 kB]
Fetched 479 kB in 1s (274 kB/s)
Selecting previously deselected package libtspi1.
(Reading database ... 49723 files and directories currently installed.)
Unpacking libtspi1 (from .../libtspi1_0.3.5-4_amd64.deb) ...
Selecting previously deselected package tboot.
Unpacking tboot (from .../tboot_1.6-0ubuntu1_amd64.deb) ...
Setting up libtspi1 (0.3.5-4) ...
Setting up tboot (1.6-0ubuntu1) ...
Processing triggers for libc-bin ...
ldconfig deferred processing now taking place
root@ubuntu01:~# cd /boot/
root@ubuntu01:/boot# ll
total 21900
drwxr-xr-x  3 root root     4096 2012-01-19 03:27  ./
drwxr-xr-x 23 root root     4096 2012-01-19 02:28  ../
-rw-r--r--  1 root root   730753 2011-10-07 16:58 abi-3.0.0-12-server
-rw-r--r--  1 root root   134862 2011-10-07 16:58 config-3.0.0-12-server
drwxr-xr-x  3 root root    12288 2012-01-19 03:26 grub/
-rw-r--r--  1 root root 13643049 2012-01-19 02:33 initrd.img-3.0.0-12-server
-rw-r--r--  1 root root   176764 2011-05-02 19:07 memtest86+.bin
-rw-r--r--  1 root root   178944 2011-05-02 19:07 memtest86+_multiboot.bin
-rw-------  1 root root  2719829 2011-10-07 16:58 System.map-3.0.0-12-server
-rw-r--r--  1 root root    73099 2011-08-26 16:41 tboot.gz
-rw-r--r--  1 root root     8799 2011-08-26 16:41 tboot-syms
-rw-------  1 root root     1366 2011-10-07 17:04 vmcoreinfo-3.0.0-12-server
-rw-------  1 root root  4718160 2011-10-07 16:58 vmlinuz-3.0.0-12-server
root@ubuntu01:/boot#
```

Note: Tboot.gz will be loaded in /boot

2. Copy the SINIT ACM from below link.
   http://software.intel.com/en-us/articles/intel-trusted-execution-technology/

Server Platform	CPU	Chipset	ID	SINIT AC Filename	Kit Download
(codename: Thurley/Tylersburg)	Intel® Xeon® Processor 5600 Series and 3500 Series (codenames: Westmere-EP and Westmere-WS)	Intel® 5520, 5500, and X58 Chipsets (codename: Tylersburg)	TXT.DIDVID.DeviceID: 0x3406h	Xeon-5600-3500-SINIT_v1.1.BIN	Xeon-5600-3500-SINIT_v1.1.zip

3. Extract the .bin file from the .zip archive

   Xeon-5600-3500-SINIT-v1.1.bin 37,120 BIN File

4. Copy the .bin file into the /boot directory

Note: For Romley Based servers the SINIT ACM is part of BIOS itself. So above steps 2 and 3 is not required for Intel E5xxx based processors.

5. Modify the menu.lst file to add an additional boot option as per below snapshot

```
$ vim /boot/grub/menu.lst
```

```
title           Xen 4.1-amd64 / Ubuntu 11.10, kernel 3.0.0-12-server Tboot/TXT
#uuid           37fa36f3-65e3-4dcc-a1b7-0b1effd7ef2d
kernel          /boot/tboot.gz logging=memory
module          /boot/xen-4.1-amd64.gz dom0_mem=1024M cpufreq=xen dom0_max_vcpus=1 dom0_vcpus_pin
module          /boot/vmlinuz-3.0.0-12-server root=/dev/sda1 ro console=tty0
module          /boot/initrd.img-3.0.0-12-server
module          /boot/Xeon-5600-3500-SINIT-v1.1.bin
```

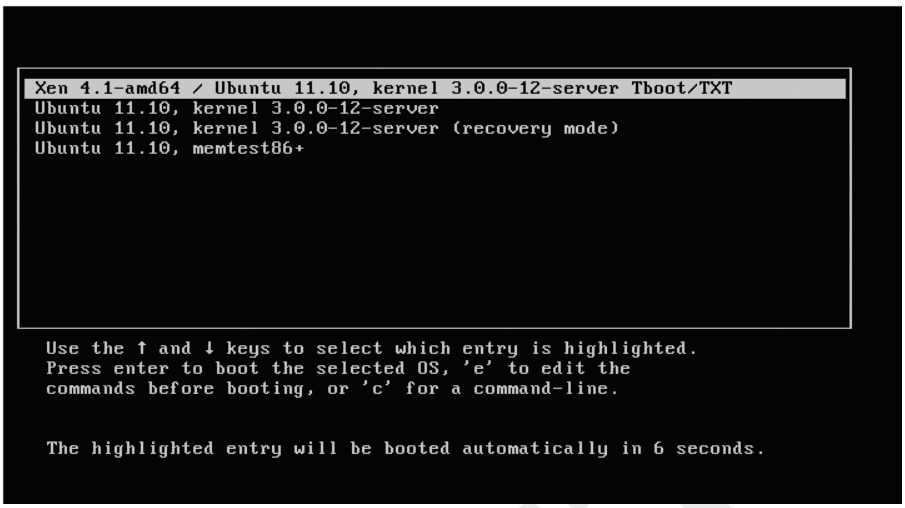
The entire section should look like this:

```
## ## End Default Options ##

title           Xen 4.1-amd64 / Ubuntu 11.10, kernel 3.0.0-12-server Tboot/TXT
#uuid           37fa36f3-65e3-4dcc-a1b7-0b1effd7ef2d
kernel          /boot/tboot.gz logging=memory
module          /boot/xen-4.1-amd64.gz dom0_mem=1024M cpufreq=xen dom0_max_vcpus=1 dom0_vcpus_pin
module          /boot/vmlinuz-3.0.0-12-server root=/dev/sda1 ro console=tty0
module          /boot/initrd.img-3.0.0-12-server
module          /boot/Xeon-5600-3500-SINIT-v1.1.bin


title           Ubuntu 11.10, kernel 3.0.0-12-server
uuid            37fa36f3-65e3-4dcc-a1b7-0b1effd7ef2d
kernel          /boot/vmlinuz-3.0.0-12-server root=UUID=37fa36f3-65e3-4dcc-a1b7-0b1effd7ef2d ro qui
et splash
initrd          /boot/initrd.img-3.0.0-12-server
quiet

title           Ubuntu 11.10, kernel 3.0.0-12-server (recovery mode)
uuid            37fa36f3-65e3-4dcc-a1b7-0b1effd7ef2d
kernel          /boot/vmlinuz-3.0.0-12-server root=UUID=37fa36f3-65e3-4dcc-a1b7-0b1effd7ef2d ro  si
ngle
initrd          /boot/initrd.img-3.0.0-12-server

title           Ubuntu 11.10, memtest86+
uuid            37fa36f3-65e3-4dcc-a1b7-0b1effd7ef2d
kernel          /boot/memtest86+.bin
quiet
```

6. Reboot the server and login as root user.

```
$ reboot
```

7. Upon rebooting, a boot menu will be displayed allowing the user to select which environment to boot to. Select the first option to boot with TXT/tboot.



8. PCR 17-19 should now appear populated when queried using the below command:

$ cat /sys/class/misc/tpm0/device/pcrs

```
root@mwtstubx01h:/# cat /sys/class/misc/tpm0/device/pcrs
PCR-00: 89 1E B0 B5 56 B8 3F CE F1 C1 0F 3F A6 46 43 45 E3 4F 8F 91
PCR-01: 3A 3F 78 0F 11 A4 B4 99 69 FC AA 80 CD 6E 39 57 C3 3B 22 75
PCR-02: AE 8E 00 D7 A3 56 CB 8A 34 56 E8 36 68 84 69 FB 04 69 96 65
PCR-03: 3A 3F 78 0F 11 A4 B4 99 69 FC AA 80 CD 6E 39 57 C3 3B 22 75
PCR-04: 77 63 05 E6 09 8A DF C3 D8 92 DF 07 E1 37 12 39 06 BA 51 89
PCR-05: 42 99 B4 AE 29 4E 72 29 AB 62 F3 55 DB 89 19 3F 58 76 A6 F9
PCR-06: 3A 3F 78 0F 11 A4 B4 99 69 FC AA 80 CD 6E 39 57 C3 3B 22 75
PCR-07: 3A 3F 78 0F 11 A4 B4 99 69 FC AA 80 CD 6E 39 57 C3 3B 22 75
PCR-08: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-09: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-10: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-11: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-12: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-13: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-14: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-15: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-16: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-17: BF C3 FF D7 94 0E 92 81 A3 EB FD FA 4E 04 12 86 9A 3F 55 D8
PCR-18: A7 13 C5 3F D7 D6 84 F0 C6 35 43 2B BE EF F6 23 5C ED 4E C3
PCR-19: E2 72 4C 0C DD EB 0D DF E8 75 A8 F3 A1 5F 8A F2 5F A0 13 96
PCR-20: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-21: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-22: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
PCR-23: 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

TCG software Stack installation

1. Login as root user and install trousers

```
$ apt-get install trousers
```

```
||/ Name                          Version                       Description
+++-=============================-=============================-==================================
ii  trousers                      0.3.5-4                       open-source TCG Software Stack (daemon)
```

```
$ apt-get install trousers-dbg
```

```
||/ Name                          Version                       Description
+++-=============================-=============================-==================================
ii  trousers-dbg                  0.3.5-4                       open-source TCG Software Stack (debug)
```

2. Run the TCSD daemon in the background.

```
$ tcsd
```

SECTION -IV

1.2 Trust Agent Prerequisites

1. Install the remaining software prerequisites

```
$ apt-get install curl
$ apt-get install libcurl3-openssl-dev
$ apt-get install chkconfig
$ apt-get -f install
$ apt-get install make
```