M1120 Reliability Test Setup for DV stage - WYHQ/Reliability use only

Hugo / Reliability Engineering 2023/11/29



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 with Clonezilla expert mode
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1) Boot into Clonezilla through USB (you can download the image from here)

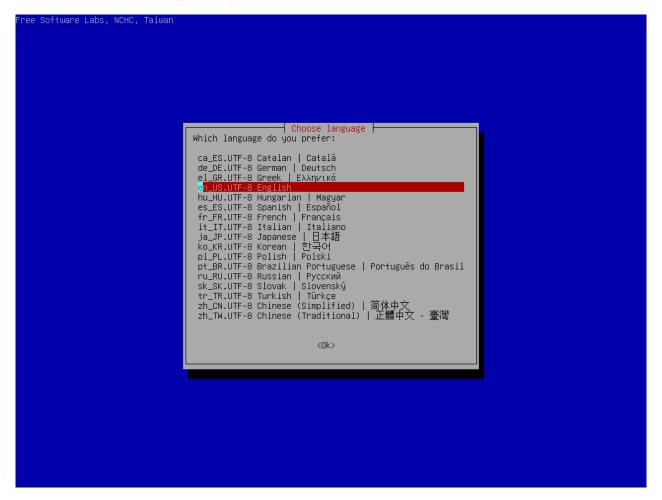


High-Performance Computing, Taiwan



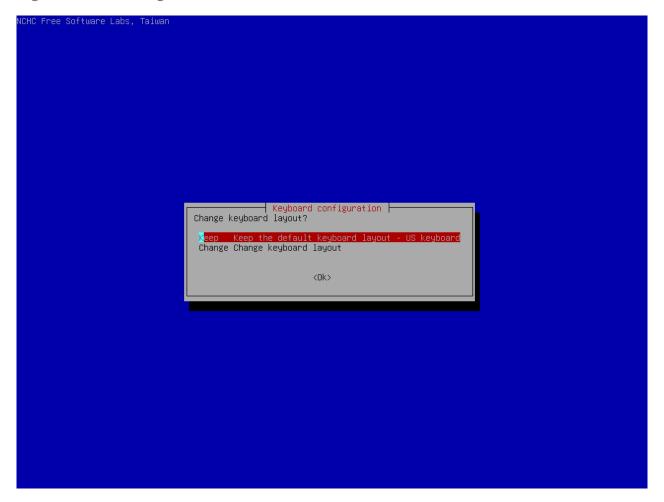


2) Choose your preferred language



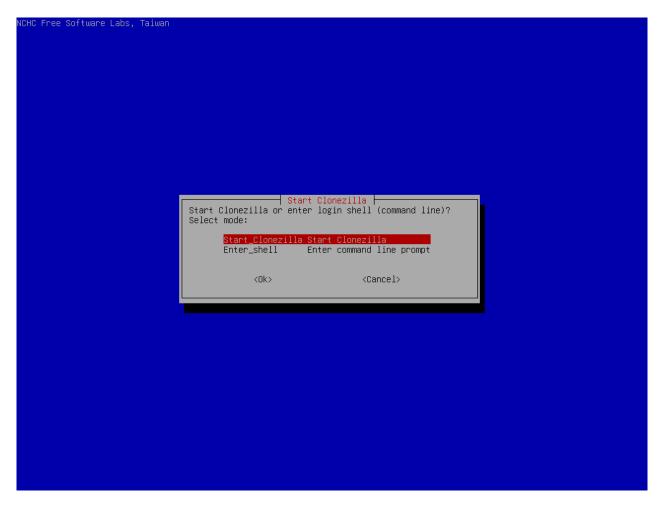


3) Choose your keyboard layout



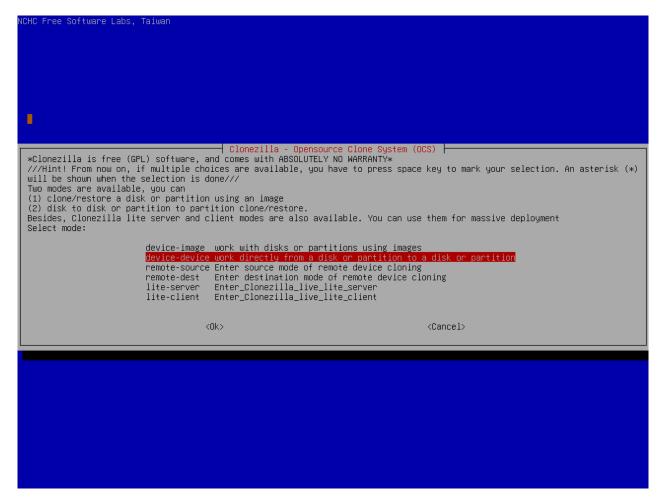


4) Start Clonezilla



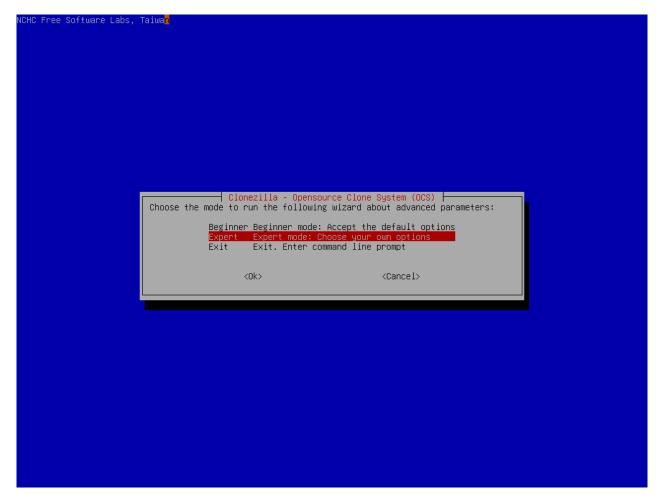


5) Choose 'device-device' mode





6) Choose 'Expert' mode



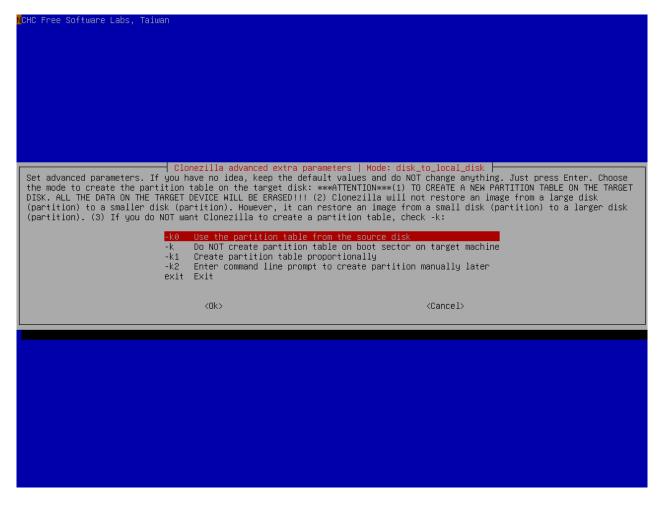


7) Unselect '-g auto' and Select '-q1' then continue

```
CHC Free S<mark>o</mark>ftware Labs, Taiwan
                        │ Clonezilla on-the-fly advanced extra parameters | Mode: disk_to_local_disk │
Set the advanced parameters (multiple choices available). If you have no idea, keep the default value and do NOT change
anything.:
                 Reinstall grub on target hard disk boot sector
                Automatically adjust filesystem geometry for a NTFS boot partition if exists
                 sfdisk uses CHS of hard drive from EDD(for non-grub boot loader)
                 Clone the hidden data between MBR and 1st partition
                 Resize the filesystem to fit partition size of target partition
                Use text output only, no TUI/GUI output
Skip cloning the MBR (Master Boot Record)
                Clone the prebuilt bootloader from syslinux (For Windows only)
                 Skip cloning the EBR (Extended Boot Record)
                Force to use sector-by-sector copy (supports all filesystem, but inefficient)
                Do NOT clone boot loader
                Continue reading next one when disk blocks read errors
                 Do not remove Linux udev hardware record after restoring.
                 Do not update syslinux-related files after restoring.
                Do not update initramfs file(s) on the restored GNU/Linux.
                Skip checking destination disk size before creating partition table
                Remove NTFS volume dirty flag in source NTFS file system before cloning it
                Skip updating boot entries in EFI NVRAM after cloning
                Force to load the saved HD CHS value
                Run clone in batch mode (DANGEROUS!)
                 Inspect checksum for files in device after cloning
                 Show verbose information
                Play sound when the job is done
                   able the direct IO mode of Partologe for NVMe SSD.
                                     <0k>
                                                                                    <Cancel>
```

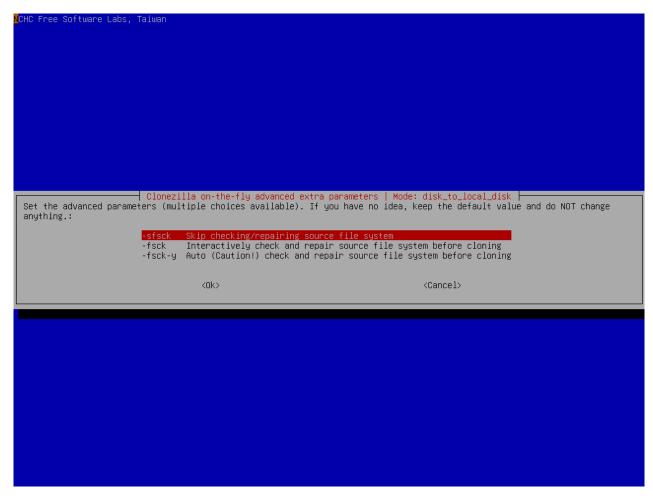


8) Choose '-k0' Use the partition table from the source disk



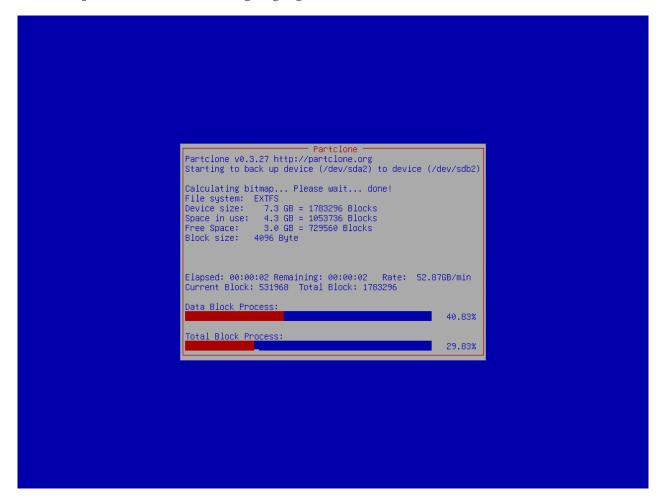


9) Choose '-sfsck' Skip checking/repairing source file system





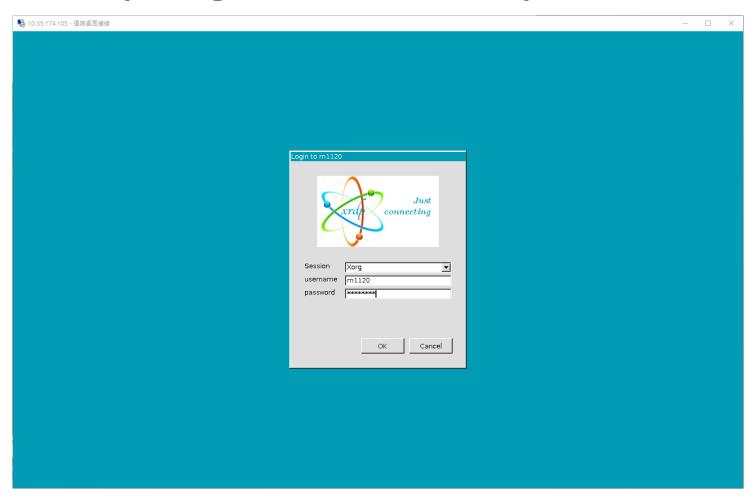
10) Wait for it to complete and enjoy your OS





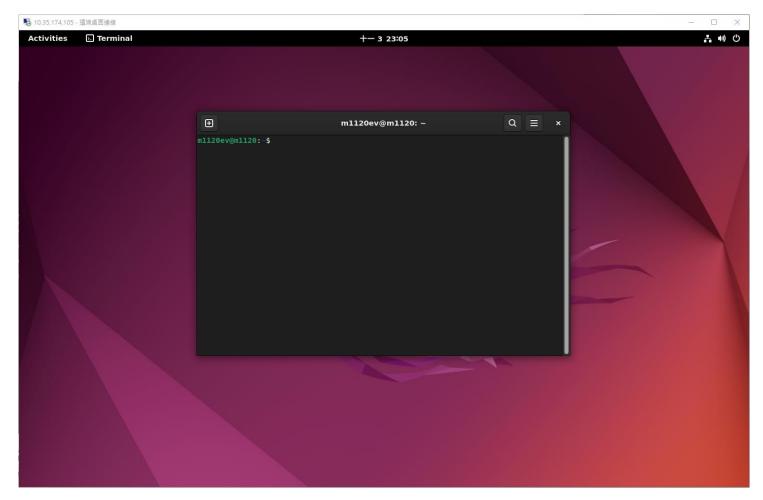


1) Use remote desktop to login to Ubuntu [m1120/p@ssw0rd]





2) Press Ctrl+T to open a terminal window



Tips:

F11: maximize current window Ctrl/Shift/+: increase text size Ctrl/-: decrease text size



3) Type hostnamectl to check the hostname

```
10.35.174.105 - 遠端桌面連線
                                                                                                          n1120@m1120rel:~$ hostnamectl
 Static hostname: m1120rel
       Icon name: computer-server
         Chassis: server
      Machine ID: f23c9d5b1e804b5f8d4bd9aea43ee72c
         Boot ID: 2efb8a48d1594f6fbb909bb5abe9f357
Operating System: Ubuntu 22.04.3 LTS
          Kernel: Linux 6.2.0-36-generic
    Architecture: x86-64
 Hardware Vendor: Microsoft
  Hardware Model: C2195
 n1120@m1120rel:~$
```



4) Type

sudo hostnamectl set-hostname <desiredname> to change the hostname

```
➡ 10.35.174.105 - 遠端桌面連線
m1120@m1120rel:~$ sudo hostnamectl set-hostname m1120tester
[sudo] password for m1120:
m1120@m1120rel:~$
```

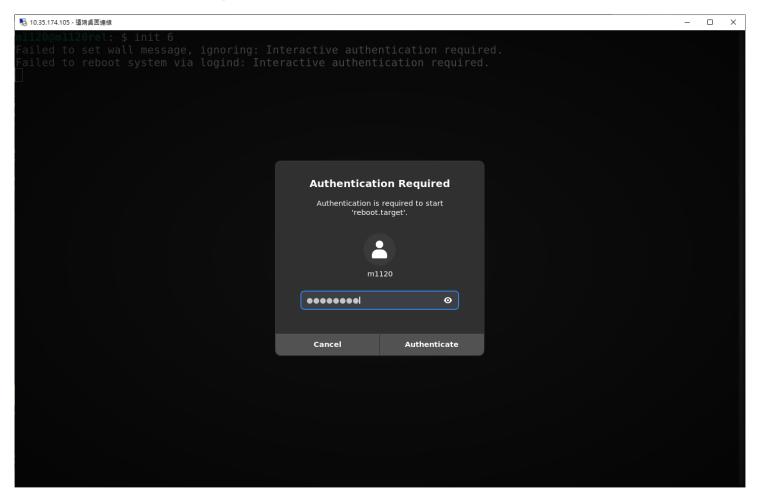


5) Type hostnamectl to check the hostname is changed

```
№ 10.35.174.105 - 遠端桌面連線
 n1120@m1120rel:~$ hostnamectl
 Static hostname: m1120tester
       Icon name: computer-server
         Chassis: server
      Machine ID: f23c9d5b1e804b5f8d4bd9aea43ee72c
         Boot ID: 2efb8a48d1594f6fbb909bb5abe9f357
Operating System: Ubuntu 22.04.3 LTS
          Kernel: Linux 6.2.0-36-generic
    Architecture: x86-64
 Hardware Vendor: Microsoft
  Hardware Model: C2195
 1120@m1120rel:~$
```



6) Type init 6 to reboot the system, make sure the new hostname is taking effect







In M1120 DV, we use Ubuntu to execute almost all the reliability environmental tests due to the Cerberus stress firmware can only work under Linux.

I created several scripts and already placed in the OS; the scripts will execute by itself if it boot up, but since there were different test condition, we might need to modify the test duration or anything, so we still need to understand it.

All script were placed in /home/m1120/BFT/

And these scripts were controlled by rc-local.service, this is the function like the startup under Windows; and this file was placed in /etc/rc.local.



The scripts we used are the followings;

Run_BFT.sh; for collecting firmware and other device info on M1120

Run_FIO.sh; for generating workload for Cerberus (aka Manticore)

Run_SDR.sh; for collecting SDR every min

Run LionTemp.sh; for collecting Cerberus die temperature

After boot up, the Run_FIO.sh, Run_SDR.sh and Run_LionTemp.sh will be executed by rc-local.service; Run_BFT.sh will be execute every 5min. After target cycles of Run_BFT finished, the rc-local.service will collect all the logs and placed in /home/m1120/BFT/BFT_Logs.

The temporary logs will be in /home/m1120/BFT/BFT_Logs_Temp and /home/m1120/BFT/M1120 DV BFT \$timestamp.



A proper BFT log will look like this →

The Tools I used here -

BIOS: dmidecode

BMC: ipmitool

SCM CPLD: ipmitool

TPM: eltt2

Lion/BMC Link Speed: Ispci

Sensor Reading: ipmitool

```
**** M1120 Configuration and Check Item ****
                    : C2195.0.BS.3A99.GN.1.2
  BMC Version
                    : 1.08
  SCM CPLD Version : 66 66 66 32 34 64 31 33
   BMC MAC Address : 5c:fe:9e:0b:a2:54
  Lion Link Status : Speed 32GT/s (ok), Width x4 (ok)
   BMC Link Status : Speed 5GT/s (ok), Width x1 (ok)
                 5.10 Volts
                 3.34 Volts
                  3.12 Volts
                  no reading
                  31 degrees C
RS Inlet HUM
                  32 percent
                  75 percent
                                      ok
Fan 1B
Fan_2A
                  24780 RPM
Fan_2B
                  22680 RPM
                                      ok
Fan_3A
Fan 3B
Fan_4A
Fan 4B
Fan_5A
                  24780 RPM
Fan 58
Fan 6A
                  24780 RPM
Fan 6B
                  22680 RPM
  BIOS Version Check
  BMC Version Check
  SCM CPLD Version Check : PASS
  Lion Link Speed Check
  BMC Link Speed Check
                           : PASS
```



An example of FIO log will look like this;

Since this is the ram disk virtualized by Manticore, we don't care about the IOPS, just make sure the test duration is correct and there's no error messages.

```
throughput-test-job: (g=0): rw=read, bs=(R) 128KiB-128KiB, (W) 128KiB-128KiB, (T) 128KiB-128KiB, ioengine=libaio, iodepth=64
Starting 12 processes
throughput-test-job: (groupid=0, jobs=12): err= 0: pid=2760: Wed Nov 8 01:52:56 2023
 read: IOPS=103k, BW=12.6Gi8/s (13.5GB/s)(111TiB/9000007msec) Test Duration
   slat (usec): min=5, max=1148.4k, avg=115.52, stdev=2688.69
   clat (usec): min=87, max=4912.6k, avg=7338.79, stdev=63872.62
    lat (usec): min=105, max=5114.8k, avg=7454.39, stdev=64888.13
   clat percentiles (usec):
                 1221], 5.00th=[
                                     1827], 10.00th=[
                 2474], 30.00th=[
                                     3097], 40.00th=[
                                                        3326],
                  3916], 60.00th=[
                  6521], 90.00th=[
                                    8160], 95.00th=[
                 13042], 99.50th=[
                                   16581], 99.90th=[1333789],
      99.95th=[1753220], 99.99th=[2122318]
  bw ( MiB/s): min= 10, max=57092, per=100.00%, avg=12891.65, stdev=1081.20, samples=215943
              : min= 82, max=456740, avg=103131.16, stdev=8649.53, samples=215943
 lat (usec) : 100=0.01%, 250=0.01%, 500=0.01%, 750=0.01%, 1000=0.01%
 lat (msec) : 2-12.51%, 4-37.59%, 10-45.62%, 20-3.94%, 50-0.12%
 lat (msec) : 100=0.01%, 250=0.01%, 500=0.04%, 750=0.01%, 1000=0.05%
 lat (msec) : 2000=0.11%, >=2000=0.02%
              : usr=0.61%, sys=8.15%, ctx=123495463, majf=2, minf=24782
 IO depths : 1-0.1%, 2-0.1%, 4-0.1%, 8-0.1%, 16-0.1%, 32-0.1%, >-64-100.0%
    submit : 0-0.0%, 4-100.0%, 8-0.0%, 16-0.0%, 32-0.0%, 64-0.0%, >-64-0.0%
    complete : 0=0.0%, 4=100.0%, 8=0.0%, 16=0.0%, 32=0.0%, 64=0.1%, >=64=0.0%
    issued rwts: total=927208912,0,0,0 short=0,0,0,0 dropped=0,0,0,0
    latency : target=0, window=0, percentile=100.00%, depth=64
  READ: bw=12.6GiB/s (13.5GB/s), 12.6GiB/s-12.6GiB/s (13.5GB/s-13.5GB/s), io=111TiB (122TB), run=9000007-9000007msec
 nvme4n1: ios=927187105/0, merge=0/0, ticks=3266060001/0, in_queue=3266060001, util=100.00%
```



A normal pretest SEL Log will look like this -

```
ipmiutil sel version 3.18
-- BMC version 1.05, IPMI version 2.0

SEL Ver 51 Support 02, Size = 4099 records (Used=4, Free=4095)

RecId Date/Time______ SEV Src_ Evt_Type___ Sens# Evt_detail - Trig [Evt_data]

0001 01/13/70 01:45:25 INF BMC Management Subsystem Health #ee Other FW HAL error 6f [a1 00 ff]

0002 01/13/70 01:47:08 INF BMC OEM(e1) #ef - 6f [03 00 ff]

0003 01/13/70 01:47:08 INF BMC OEM(e1) #ef - 6f [03 10 00]

0004 01/13/70 01:47:08 INF BMC OEM(e1) #ef - 6f [03 20 00]

ipmiutil sel, completed successfully
```

0001 : CPLD boot SEL (from CFG0 to CFG1 boot)

0002 to 0004: System config didn't match with inventory.json

- Above entries are expected logs, can be ignored

```
ipmiutil sel version 3.18
-- BMC version 1.05, IPMI version 2.0
SEL Ver 51 Support 02, Size = 4095 records (Used=0, Free=4095)
RecId Date/Time_____ SEV Src_ Evt_Type___ Sens# Evt_detail - Trig [Evt_data]
Firmware Log (SEL) is empty
ipmiutil sel, completed successfully
```

- Above log means SEL is empty (Known Issue: Bug 1480424)



A Lion temperature Log will look like this -

It's generating automatically by Lion itself, We use header cable/UART to collect the temperature readings from Lion.

The only value we care about is Channel 7; We'll use the value to check the workload.

```
Row 0 0x10 otp idfuse read 0x50a19913 and readback is 0x50a19913
Row 1 count 0x10 otp idfuse read 0x80ffff09 and readback is 0x80ffff09
 unning AES, SHA and UPKA0-15 in continous loop
           PCIe0: TSEN CH1 DATA = 821 Output Raw = 202 Output Temp = 49
                  TSEN CH2 DATA = 823 Output Raw = 200 Output Temp = 50
                  : TSEN CH3 DATA = 818 Output Raw = 205 Output Temp = 48
           UPKA1 : TSEN CH4 DATA - 819 Output Raw - 204 Output Temp - 48
           NOM: TSEN CH5 DATA = 814 Output Raw = 209 Output Temp = 46
           BCP: TSEN CH6 DATA = 816 Output Raw = 207 Output Temp = 47
         - Middle: TSEN CH7 DATA = 814 Output Raw = 209 Output Temp = 46
Row 0 0x10 otp idfuse read 0x50a19913 and readback is 0x50a19913
Row 1 count 0x10 otp idfuse read 0x80ffff09 and readback is 0x80ffff09
unning AES, SHA and UPKA0-15 in continous loop
           PCIe0: TSEN CH1 DATA = 821 Output Raw = 202 Output Temp = 49
           PCIe1: TSEN CH2 DATA = 824 Output Raw = 199 Output Temp = 50
                 : TSEN CH3 DATA - 817 Output Raw - 206 Output Temp - 47
           UPKA1 : TSEN CH4 DATA = 818 Output Raw = 205 Output Temp = 48
           NOM: TSEN CH5 DATA = 815 Output Raw = 208 Output Temp = 46
           BCP: TSEN_CH6_DATA = 816 Output Raw = 207 Output Temp = 47
Channel 7 - Middle: TSEN CH7 DATA = 814 Output Raw = 209 Output Temp = 46
Row 0 0x10 otp idfuse read 0x50a19913 and readback is 0x50a19913
Row 1 count 0x10 otp idfuse read 0x80ffff09 and readback is 0x80ffff09
           SHA and UPKA0-15 in continous loop
           PCIe0: TSEN CH1 DATA = 819 Output Raw = 204 Output Temp = 48
           PCIe1: TSEN CH2 DATA = 823 Output Raw = 200 Output Temp = 50
                  : TSEN CH3 DATA = 817 Output Raw = 206 Output Temp = 47
           UPKA1 : TSEN CH4 DATA = 819 Output Raw = 204 Output Temp = 48
           NQM: TSEN CH5 DATA = 815 Output Raw = 208 Output Temp = 46
           BCP: TSEN CH6 DATA = 819 Output Raw = 204 Output Temp = 48
         - Middle: TSEN CH7 DATA = 815 Output Raw = 208 Output Temp = 46
Row 0 0x10 otp idfuse read 0x50a19913 and readback is 0x50a19913
Row 1 count 0x10 otp idfuse read 0x80ffff09 and readback is 0x80ffff09
unning AES, SHA and UPKA0-15 in continous loop
           PCIe0: TSEN CH1 DATA - 822 Output Raw - 201 Output Temp - 49
           PCIe1: TSEN CH2 DATA = 825 Output Raw = 198 Output Temp = 50
                  : TSEN_CH3_DATA = 820 Output Raw = 203 Output Temp = 48
                 : TSEN CH4 DATA = 819 Output Raw = 204 Output Temp = 48
           NOM: TSEN CH5 DATA = 817 Output Raw = 206 Output Temp = 47
           BCP: TSEN_CH6_DATA = 817 Output Raw = 206 Output Temp = 47
Channel 7 - Middle: TSEN CH7 DATA = 815 Output Raw = 208 Output Temp = 46
Row 0 0x10 otp idfuse read 0x50a19913 and readback is 0x50a19913
Row 1 count 0x10 otp idfuse read 0x80ffff09 and readback is 0x80ffff09
unning AES, SHA and UPKA0-15 in continous loop
          PCIe0: TSEN_CH1_DATA = 822 Output Raw = 201 Output Temp = 49
           PCIe1: TSEN CH2 DATA = 826 Output Raw = 197 Output Temp = 51
                 : TSEN CH3 DATA = 819 Output Raw = 204 Output Temp = 48
           UPKA1 : TSEN CH4 DATA = 819 Output Raw = 204 Output Temp = 48
           NQM: TSEN CH5 DATA = 818 Output Raw = 205 Output Temp = 48
          BCP: TSEN CH6 DATA = 818 Output Raw = 205 Output Temp = 48
         - Middle: TSEN CH7 DATA = 816 Output Raw = 207 Output Temp = 47
```



Long story short, the BFT/SDR/FIO will run for a specific of time/cycle, and LionTemp will generate automatically so we cannot control the time or cycle.

To modify the test duration, all we have to do is to edit the file TestDurarion.cfg under directory /home/m1120/BFT, the unit is minute.

```
m1120@SPHT2:~/BFT$ ls

BFT_Logs cerberus eltt2 mprime Run_BFT.sh Run_LionTemp.sh

BFT_Logs_Temp diskspd-for-linux M1120_DV_BFT_20231124_174517 Reset.sh Run_FI0.sh Run_SDR.sh

m1120@SPHT2:~/BFT$ cat TestDuration.cfg

720
```

After modified the specific duration, you can use Reset.sh in the same directory to clear all test logs, and then reboot to start the test.



Scripts We Run - Result Collector

After a test is finished, you can use this script to collect the logs from Ubuntu, but make sure your laptop is connected to it though network. You can modify the Setup area for different number of samples as you desired.

```
@echo off
SetLocal EnableDelayedExpansion
title=M1120_DV_Log_Collector

:Setup

set /a TotalBlade=2
set SampleName[1]=SPHT1
set SampleName[2]=SPHT2

for /1 %%n in (1, 1, %TotalBlade%) do (
    echo [ - Collecting Data from !SampleName[%n]! ]
    rm -rf .\Test_Logs\!SampleName[%n]!
    mkdir .\Test_Logs\!SampleName[%%n]!
    pscp.exe -p -r -pw p@ssw0rd m1120@!SampleName[%n]!:/home/m1120/BFT/BFT_Logs/* .\Linux_Logs\!SampleName[%n]!\ > nul
    pause
```



Scripts We Run - Result Checker

Following script will help you to check the BFT logs, it's a simple script for checking all BFT logs you executed and give you an instant result. And you can modify the setup area for different number of samples too.

```
title=M1120_DV_BFT_Log_Check
setlocal EnableDelayedExpansion
set SampleName[1]=SPHT1
echo [Step 1/3] Creating timestamp ...
 Powershell get-date -format "{yyyyMMdd_HHmmss}" > Timestamp.txt
set /p Timestamp=<.\Timestamp.txt
del Timestamp.txt</pre>
echo [Step 2/3] Checking test data ...
echo /// TEST RESULTS /// >> __M1120_AC_Result_%Timestamp%.log
echo ==========>> __M1120_AC_Result_%Timestamp%.log
for /1 %%n in (1, 1, %TotalBlade%) do (
setlocal enabledelayedexpansion
    for /d %%d in (Test Logs\!SampleName[%%n]!\M1120 DV BFT *) do (
        set /a A_CYCLE+=1
        findstr /S /i /c:"** BFT FINAL RESULT
         if !errorlevel! == 0 set /a A_FAILED+=1
         findstr /S /i /c:"** BFT FINAL RESULT
         if !errorlevel! == 1 set /a A_PASSED+=1
```

```
echo [ !SampleName[%%n]! ] >> __M1120_AC_Result_%Timestamp%.log
echo - Cycles: !A_CYCLE! >> __M1120_AC_Result_%Timestamp%.log
   [Step 3/3] Collecing failed tests ...
for /1 %%n in (1, 1, %TotalBlade%) do (
setlocal enabledelayedexpansion
   echo [ !SampleName[%%n]! ] >> __M1120_AC_Result_%Timestamp%.log
   for /d %%d in (Test_Logs\!SampleName[%%n]!\M1120_DV_BFT_*) do (
      set /a A_CYCLE+=1
      findstr /S /i /c:"** BFT FINAL RESULT
      echo %%~nxd | awk -F_ "{print $4,$5}" >> __M1120_AC_Result_%Timestamp%.log
   echo ==========>> __M1120_AC_Result_%Timestamp%.log
echo Data collection is completed.
```



```
-----
 /// TEST RESULTS ///
_____
 SPHT1
- Cvcles: 9
- Pass:
- Fail:
_____
- Cycles: 7
- Pass:
______
 /// FAILED TESTS ///
_____
SPHT1 1
20231123 111511
20231123 112816
_____
SPHT2 ]
_____
```





Scripts We Run - Known Issue

Since the stress firmware on Manticore is a non-official version, there are some known issues that we confirmed with Microsoft, so it can be ignored.

- 1) Ramdisk or Cerberus controller will disappear from time to time
 - a) Use command \$ IsbIk | grep 32M to check the ram disk
 - b) Use command \$ Ispci -d 1b4b:c003 to check the controller
 - c) If above command didn't print anything, it means those item were lost
- 2) FIO test will fail from time to time and cannot execute again
 - a) Check the FIO.log under directory /home/m1120/BFT/BFT_Logs after test
 - b) Sometimes the ram disk size became 0M from 32M after FIO failed

These 2 issues were not resolved, the only thing we can do is reboot/AC cycle to bring them back; AC power cycle is recommended for higher success rate.



Scripts We Run - Disconnection Issue

If you are remote controlling the sample but not using a DHCP server, you'll probably encounter a disconnection issue; this phenomenon is caused by PPPoE service is trying to check the network connection but failed to receive the confirmation from the server. There are 2 workarounds for this issue:

- 1) Simply unplug and re-plug the RJ45 cable and reconnect the sample; but it will disconnect every 5-10 minutes. Not recommended.
- 2) Modify the /etc/ppp/options and change the following value:
 - a) lcp-echo-failure [from 4 to 100]
 - b) lcp-echo-interval [from 15 to 600]

Save and restart the service (\$ systemctl restart NetworkManager)
Above command should be executed every time you logged in.





Swap the M1120 - Preparation

Because we do not have enough C2195 (as a fixture), in some circumstances we might have to change the M1120 (as test sample) and continue the validation.

As previous mentioned, the Lion temperature must be recorded by UART cable, therefore, instead of changing the M1120 itself, we also have to connect the UART cable for logging the Lion temperature.

In following pages, I will show you how to install/uninstall the M1120 into the C2195 and connect/disconnect the UART cable when you have to do it.

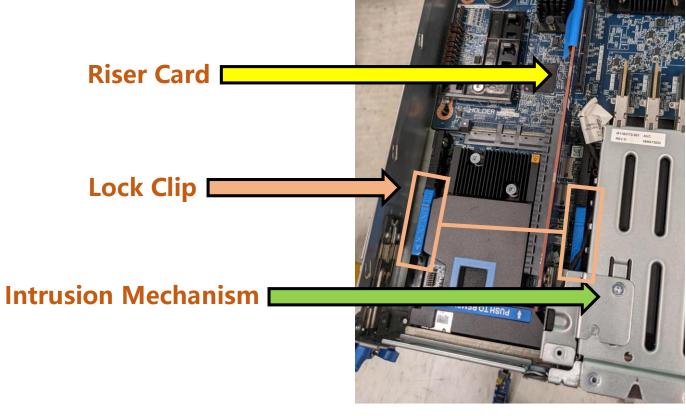
We will need to use a Torx T10 screwdriver to proceed.



Swap the M1120 - Disassembly

After removing the top cover, you will see the M1120 on the front-left side of C2195 as it showed below, we need to remove the riser card and the intrusion

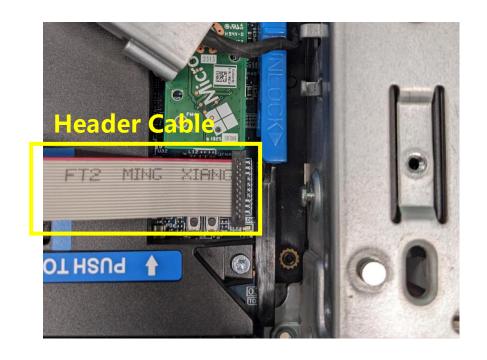
mechanism first (use the Torx T10 screwdriver).





Swap the M1120 - Disassembly

After removing the intrusion mechanism, we need to remove the header cable from JCN6 (on M1120 side). Be careful, the header cable is very fragile, I would recommend to use a flat head driver to remove it (like I showed below).







Swap the M1120 - Assembly

When the header cable is removed, you can just unlock the clip and push the M1120 out of sample. For installing the M1120, just reverse these steps.

Be aware, there are 2 types of header cables, no matter which one you get, just keep the red line toward to TPM card and install back in the JCN6.

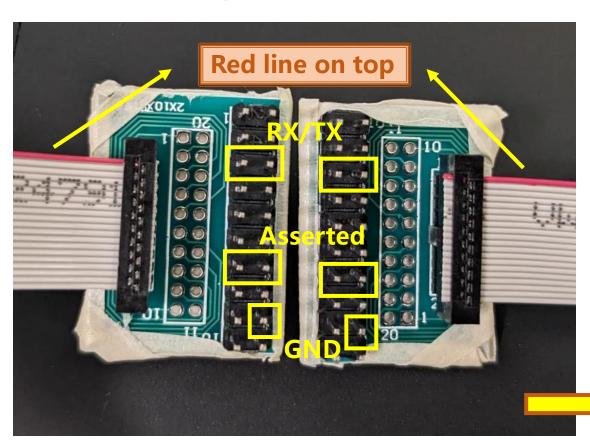


Type A Type B



Swap the M1120 - Assembly

The header cable should be connected to USB UART cable, but sometimes it fall apart; following the below instruction to assemble with female header wires.



5 - RX

6 - TX

13/14 - Asserted with Jumper

Pin 18 - GND

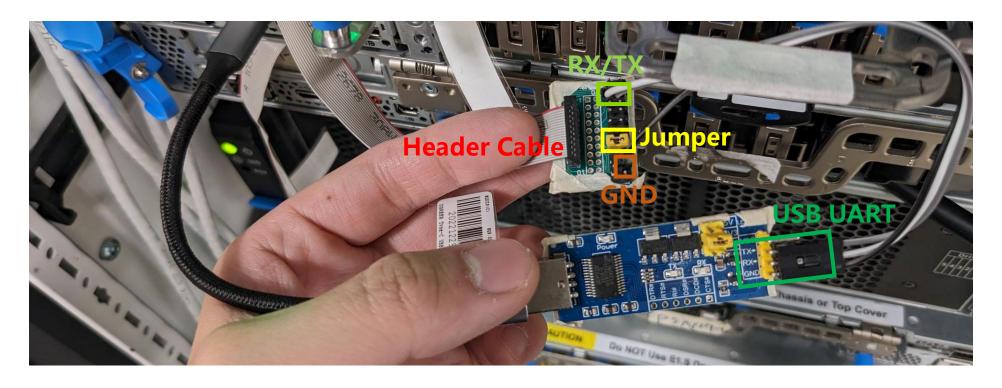


Connect with USB UART



Swap the M1120

The following photo is the overview of header cable and USB UART cable, pin 13/14 must be asserted by jumper for keeping the stress firmware active. If you power on the C2195 without pin 13/14 of JCN6 asserted, the stress firmware will not retain and will need to flash again with Dediprog.





Swap the M1120

Remember to connect the USB UART to a Type C-to-A converter cable and connect in back to sample itself, so that the C2195 can capture the Lion temperature logs though UART cable.







thanks mate