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Main Execution File

Description

The System Level Test(SLT) program is to automatically verify if the hardware feature of the ASPEED's BMC chip is functions normally. The SLT program inputs testing data, and hardware register to produce the result. At last, the SLT program compares the final executed results with the expected ones, to show pass or fail on the screen and record them the result into a log file.

Parameter usage

sltxxxx [sltxxxx.inf] [log file] <loop times> <-q>
for example: slt2500 slt2500.inf 1.log

[] : one necessary parameter

< > : one optional parameter

xxxx: the texts depends on chip you use

log file: any file name and its content are logs that save the result of each testing item.

loop times: the number of how many times to execute the SLT program

-q: during excutation cycles, the program will exit when the testing error happens.

INF file

The INF file (ex: slt2500.inf, the file name depends on chip you use) includes many testing items associated with the hardware functions. Those items can be categorized into two parts, SOC part and VGA part. You can skip or recover the testing item by adding or deleting semicolon “;” in the front of the testing item.

Skip VideoTest

```
;videotest 1  
rsatest hwtest2 rsa1024.bin log=rsa1024.log  
traptest  
plltest 1  
hactest 1
```

Recover VideoTest

```
videotest 1  
rsatest hwtest2 rsa1024.bin log=rsa1024.log  
traptest
```

plltest 1
hactest 1

LOG file

After finishing the SLT program, the result is shown on the screen with a huge word (pass or fail). If the result fails, which item is failed will listed on the screen. For the detailed result, you can open the log file to learn which item fails.

Check the item

The log file lists the failed or pass of each item in front of the item name. If some items fail, the failed items have the corresponding log on the directory you can refer and we will explain each item as below.

```
*****  
*** AST2500 SLT Utility v.0.80.03 Test Log ***  
*****  
[Info] VRAM Size: 32 MB  
[Info] VRAM CLK: 396 MHz  
[Info] VRAM Bus Width: 16 Bits  
[PASS] Bounding Check Pass!!  
[PASS] Video Test PASSED in Round 0  
[PASS] RSA Test PASSED  
[Error] H/W TRAP Test FAILED  
[PASS] PLLTest PASSED in Round 0  
[PASS] HACTest PASSED in Round 0  
[PASS] Standard VGA Test PASSED  
[PASS] VGA REGTest PASSED  
[PASS] DRAMTest PASSED in Round 0  
[PASS] 2DTest PASSED in Round 0  
[PASS] HWCTest PASSED in Round 0  
[PASS] GAMMA Test PASSED
```

Testing Item

mactest and ncsitest (SOC Part Test)

Please refer to the document "MAC_RdMe.pdf" and this item doesn't exist when the chip supports VGA feature only.

videotest(SOC Part Test)

Description

This test is to verify the functionality of video engine. At the beginning, a sample graph is shown on the screen, then use video engine to compress video from screen and compare the result of compression with checksum that calculated in advance.

The testing process is to run different configuration of compression quality(Low to High) ,format(YUV444, YUV420) and encryption (RC4), then the result is verified in the each setting.

LOG file

The result of the testing process saves in the file “video.log”

pass

If the testing process doesn't face any problem, it saves the following sentence into the log file that its name is Video.log.

```
Video Engine Diagonosic Test PASSED
```

fail

If the test result of the video engine execution fails, the following failure description lists in the log file

```
JPEG Test FAILED at YUV420 Quality 1
```

Traptest (SOC Part Test)

Description

This test is to verify the Strap pins from the hardware strap registers. The main purpose of this test item is to check the setting of VGA memory size selection of the optional strap pins. If you use a different VGA memory size value other than the default value size (16MB), you must change the parameter (vga_size) in the INF file (trap.inf).

INF file

The INF file has three parameters (cpu_axi_ratio, axi_ahb_ratio, vga_size). In most cases, the first two parameters should not be modified and will not fail on the default CPU and BUS clock frequency. The third parameter (vga_size) needs to be modified when the video size value is different from the default value size (16MB).

```
cpu_axi_ratio= 1  
axi_ahb_ratio= 2  
vga_size= 16
```

LOG file

pass

If the test process doesn't encounter any problem, it will save following sentence into the log file under the file name trap.log.

```
[PASS] H/W TRAP Test PASSED
```

fail

If the value read back from strap registers is different from the value in the INF file, the following failure description would be listed in the log file under the name tra.log. In the following case, "Correct" means that the value of the parameter (VGA_SIZE) is 16, but the actual Strap pins of VGA memory size selection is 32. Make sure the VGA memory size value selection the strap pins is 32. If the setting is correct, modify the INF file and will pass this test.

```
[Error] VGA Size: Correct is 16; Real is 32
```

PIItest (SOC Part Test)

Description

This test is to measure clock frequency such as Memory, CPU, PCI, LPCI, Display ..etc. If the failure happens, it means the clock frequency of the failure item is incorrect with the expected clock frequency. You may ask engineer to actually measure the clock frequency with an adequate equipment, e.g. scope.

INF file

The first two parameters are used to set Frequency comparison range. In most cases, we don't need to modify them, except you need to enlarge the threshold of frequency comparison limitation.

Other parameters are the frequency clock you may want to measure.

```
errrate 1  
errrate_pci 2  
cmpring m-pll  
cmpring pci-pll  
;cmpring lpc-pll  
cmpring h-pll  
setmode 640x480x16bpp@60
```

```
cmpring d-pll  
setmode 640x480x16bpp@72  
cmpring d-pll
```

LOG file

pass

We take m-pll as an example. If this measurement passes, the following sentence is saved into the log file under the file name plltest.log

```
[INFO] PLL Predict Count = 107f, Actual Count = 1080  
[PASS] m-pll PLL Check Pass!!
```

fail

The value of PLL Predict Count is the counter calculated by the desired clock frequency and the value of Actual Count is measured by HW engine. If two values are different and larger than the Frequency comparison range, this testing item failed.

```
[INFO] PLL Predict Count = 107f, Actual Count = 1070  
[PASS] m-pll PLL Check Failed!!
```

rsatest (SOC Part Test)

Description

This item tests the RSA algorithm hardware acceleration and compare the result with the answer that obtained in advance.

LOG file

pass

If the test passes, the pass statement is saved into the file "rsa1024.log".

fail

If the test fails, the program will save the debug information into the file ras1024.log, you should send this file to ASPEED.

hactest (SOC Part Test)

Description

This test is to verify Hash Engine and Crypto Engine. It tests encryption and decryption of MD5, SHA1, SHA256, AES, DES, and RC4 and compares the result with the data calculated by software algorithm.

INF file

This test has a configuration file "hactest.inf" in the directory. Using DES for example, the des_key is the crypto key that the program uses. The des_enc_a and des_dec_a mean testing encryption and decryption. The parameter ecb is DES operation mode. The parameter disable is to disable MIX mode. The other parameters is the crypto data used during testing.

```
::DES  
des_key          0x01 0x23 0x45 0x67 0x89 0xAB 0xCD 0xEF  
des_enc_a ecb disable 0x4E 0x6F 0x77 0x20 0x69 0x73 0x20 0x74  
des_dec_a ecb disable 0x4E 0x6F 0x77 0x20 0x69 0x73 0x20 0x74
```

LOG file

pass

If the test passes, the pass statement is saved into the file "hactest.log". The summary is as follows.

```
[PASS] DES 256 ECB Mode Descrypt Test Pass!!
```

fail

If the test fails, the program will print the GOLDEN data that calculated by software and the HW data under the file "hactest.log"

stdvgatest (VGA Part Test)

Description

This test is only run under the DOS. It tests the standard VGA mode by changing the resolution to EGA mode.

vgaregtest (VGA Part Test)

Description

The vgaregtest is to write the VGA relative register, then read back the register to compare if the data remains the same. It is used to make sure the VGA function is available.

LOG file

pass

IF all VGA registers read/write normally, the test passes and the result saves under the file regtest.log

fail

if the result doesn't match, the problem would be saved via an error statement under the file regtest.log

dramtest (VGA Part Test)

Description

This test is to make sure that the video memory is workable. The program writes data into the video memory first, then read back from the video memory and check if the data is the same.

INF file

In the first line of the file "dram.inf", it is to change resolution mode to the one that we plan to test.

In the second line, the first parameter ot means the program checks the data after all video buffer was written. The second parameter means the data unit that it writes every time and the unit has byte, word and dword. The third parameter means the value of the data increase(inc) or decrease(dec).

```
setmode 1024x768x32bpp@60  
ot dword inc
```

pass

If the program writes and reads the video memory correctly, the following message will be saved in the file "dramtest.log"

[PASS] OTTest Pass

fail

If the wrote data and data read back are not the same, it will show the fail message under the file "dramtest.log"

[ERROR] OTTest Failed!!

2Dtest (VGA Part Test)

Description

The 2Dtest is to verify HW 2D engine including the bitBLT operations, Line drawing, and raster operation (ROP). During the test, the program chooses one resolution as display destination, then draw pattern, bitmap and line onto the display. The test calculates the checksum of 2D operation with software, then compares it with HW operation.

INF file

The 2dtest.inf file is the configuration setting to excuse 2D operation. Because 2D has many kinds of operations, each section stands for one of 2D operation verification. It will take some sections to explain.

The following section is to verify bitBLT operation. One 2D operation needs the combination of some commands to accomplish.

- The meaning of the command setpatcolor is to set pattern color. It's format is
setpatcolor [Pat object ID] 0x[FG] 0x[BG]
- The command setpatmask is to set mask pattern. It's format is
setpatmask [Pat object ID] 0x[M0] 0x[M1] 0x[M2] 0x[M3] 0x[M4] 0x[M5] 0x[M6] 0x[M7]
- Then, Loadbmp is to load BMP to video memory. It's format is
loadbmp_vm [src surface ID] [file name]
- And then, setblt is to set up bltblt.
setblt [src surface ID] [Pat object ID]
- Finally, The command doblt is to do bitblt. It's format is
doblt [Loop] 0x[Rop] [Pat type] [DstX] [DstY] [SrcX] [SrcY] [Width] [Height]
>> Pat Type: 0/1/2: Solid/Mask/Pattern Reg
>> [DstX] - [Height]: 'r' means random
>> ROP type: 0xCC, 0xF0 only now

Configuration of BitBlt test

```
setpatcolor 0 0xffffffff 0x000000
setpatmask 0 0xff 0xff 0xff 0xff 0xff 0xff 0xff
loadbmp_vm 0 logo.bmp
setblt 0 0
```

```
dobl 50 0xcc 0 r r r r r
```

The following section is to verify line drawing operation.

- The setpatcolor command has been introduced in the earlier section.
- Then, the command setline is to set up Line Draw

```
setline [Pat object ID]
```

- Finally, the command doline is to do line draw

```
doline [Loop] 0x[Rop] [Pat type] [X1] [Y1] [X2] [Y2]
```

```
>> Pat Type: no meaning
```

```
>> [X1] [Y1] [X2] [Y2]: starting and ending position, 'r' means random
```

```
>> Rop Type: 0xF0 only
```

```
>> Pat Type: no meaning now
```

Configuration of Line draw test

```
setpatcolor 0 0xffffffff 0x000000
```

```
setline 0
```

```
doline 50 0xf0 0 r r r r
```

The following section is to verify raster operation (ROP).

- The final command roptest is to do ROP test

```
roptest [Loop] [src surface ID] [Pat object ID] 0x[ROP] [Pat Type] [CRC golden file]
```

```
>> Pat Type: 0/1/2: Solid/Mask/Pattern Reg
```

```
>> ROP/Pat Type: test all if 'all'
```

Configuration of ROP test

```
setpatcolor 0 0xffffffff 0x000000
```

```
setpatmask 0 0xff 0xff 0xff 0xff 0xff 0xff 0xff
```

```
setpattern 0 pat_1.bmp
```

```
loadbmp_vm 0 logo.bmp
```

```
;roptest 1 0 0 all 0 crc_1.inf
```

```
roptest 1 0 0 0x00 0 crc_1.inf
```

```
roptest 1 0 0 0x3f 0 crc_1.inf
```

```
roptest 1 0 0 0x44 0 crc_1.inf
```

LOG file

```
pass
```

If the result of 2D operation that HW and software are the same, the following pass message will be saved under the file 2Dtest.log.

```
[PASS] Blt Test Pass!!
```

fail

If the test result is different, the program will save detailed information in file 2Dtest.log to debug.

```
[ERROR] Blt: Check BitBlt Failed  
  lSrcX: 0 lSrcY: 0  
  lDstX: 100 lDstY: 100
```

hwctest(VGA Part Test)

Description

This test is to test the HW cursor function. It draws bitmap cursor on the screen, changes the cursor shape and moves the cursor to a different position. Finally, the program calculates the checksum from the screen that the hw cursor had draw and compares with the golden value that calculated in advance.

INF file

According to the following content got from hwctest.inf, it sets the monitor resolution first, then loads arrow.bmp, 3dgarro.bmp and harrow.bmp as the candidate (0, 1, 2) of shape of the cursor. The command "change 0" means that it uses candidate 0 as the shape of the cursor. The command "move 0 0" means that the cursor is moved on to the 0.0 position of the screen. Finally, the command `crchk 0x1e1e1e` is to compare the checksum of the screen with the Golden value(0x1e1e1e)

```
setmode 1024x768x32bpp@60  
bmp arrow.bmp 0  
bmp 3dgarro.bmp 1  
bmp harrow.bmp 2  
change 0  
move 0 0  
crchk 0x1e1e1e  
change 1  
move 0 0  
crchk 0xccf2f2  
change 2  
move 0 0  
crchk 0x52c5c5
```

Log file

pass

If the checksum compared with the GOLD value are the same, the following pass message will be saved under the file name hwctest.log.

[PASS] HWC CRC Check Pass!!

fail

If the checksum are different, the message will show the golden value and the real value in the log file

[ERROR] HWC CRC Check Failed!!
Correct CRC: 0x1e1e1e, Get CRC: 0x393484