Challenges of SSD test scaling

Presented By: Andy Niemic, Advantest

Problem Set

"Moving to Full Performance Parallel Test"

Testing a Single Device (Bench Testing)

- Easy to interact with a single device
    - Controlling what that device does
    - Handling what happens when the device fails
    - Does not impact with other devices
        - Easy to get repeatability results
        - Can validate performance spec

- Easy to track down physical issues with a single socket
    - If the socket connector fails, it easy to know which socket has failed vs the device has failed
    - You know which load board has the issue, because there is only one and it can not be interchangeable
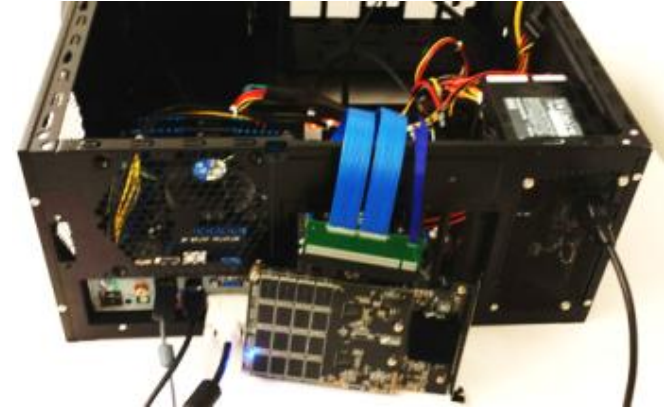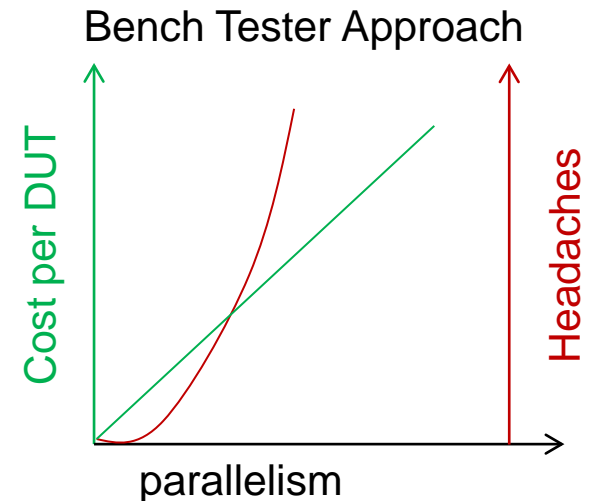
Testing Many Devices In Parallel (Scale Testing)

- Issues that happen with testing a lot of devices at once
  - How do you manage and control a lot of devices at once?
  - How do you handling when devices fail?
  - How do you make sure devices do not impact with each other?
    - How do you get repeatable results?
    - How get consistent performance results?

- Physical issues when testing a lot of device at once with interchangeable load boards
    - How do you know if the problem is the device or the connector?
    - How do you know if the problem is the device or load board?

Why get the headache when you want to test many devices at once?

Testing more than one device makes some things much easier:

- Support of high volume
  - Scalable solution (ATE solution)

- Adding thermal tests

- Adding power supply control

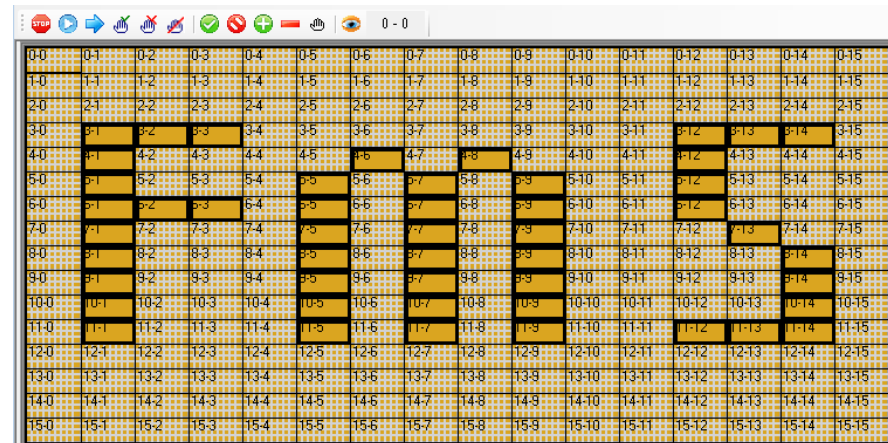- Reducing the cost of test by sharing some of the common resources

Bench Tester Approach

Possible ways to solve these issue

Controlling Many Devices in Parallel

It is important that able to control the device in an independently as possible.

- This is done by making testing a lot of devices feel closer to testing a single device.
  - A way to do this is by using a GUI solution that gives the feeling of testing a single device at the same time be able to control a group of devices at once.
  - The user should not need to know or understand the tester hardware – keep the SSD engineers focused on the SSDs!

256 Devices at once with single device controllability

Handling Device Failures

When having a lot of device having a way to support the handling of device failures

- Having an ATE solution that supports a BIN out for failed device

- By sending the results to a database rather than just printing out the results to a screen can give add a lot of scalability

Green boxes are PASS
Red boxes are FAILED

Device Independence

Having devices be as independent as possible will allow the system to be able to scale very easy without having each device effect each other

Example:

- If a device or test crashes, you don't want it to to effect other devices

- The test should not behave differently as when you test a group versa a single device at once

- Having independence resources allows consistent performance results
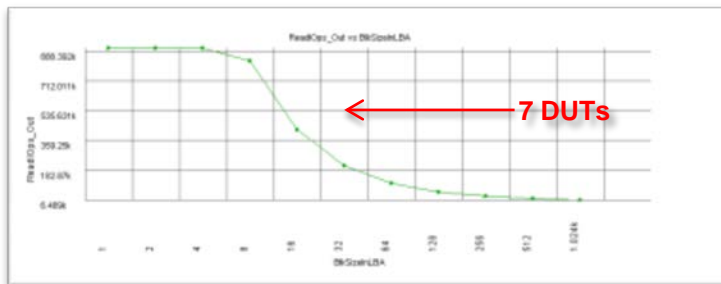
Independent resources running 7 devices at once
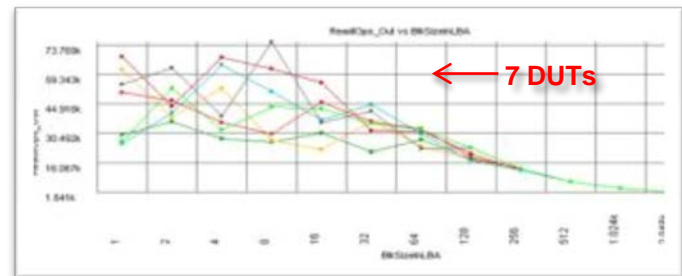
Shared resources running 7 devices at once

Socket Connector Tracking

When you start using many load boards, it is important to have the system track the socket connector

- Help detect if the issue is from the device or from socket connector:

    - Has other devices failed the same way a few times in the same socket connector?

    - Has the type of failures been the similar in the last few device in the same socket connector?

Load Board Tracking

- When you start using many load boards, it is important to have the system track the load boards
  - Keep track of how many times devices have been inserted into the load board
  - Has the load board started having socket connector failures
  - Keep track how long and what temperatures have the load board gone through

  This can help predict load board failures before they are even started happening, but knowing when load boards are near end of life.

Summary

When you want to scale the number of device you are testing

- The devices should be as independent as possible to each other
  - Device don't effect each other
  - So the results are repeatable

- Keep track of how the device has BIN out for each socket connector

- Keep track of the load board history
  - How many devices have been plug- into it
  - What temperatures and test have the load board gone through

Bench Tester Approach

Cost per DUT | Headaches

parallelism

ATE Approach

Cost per DUT | Headaches

parallelism