TPFUG
Washington, D.C.

2014 TPF Users Group

Performance Topics

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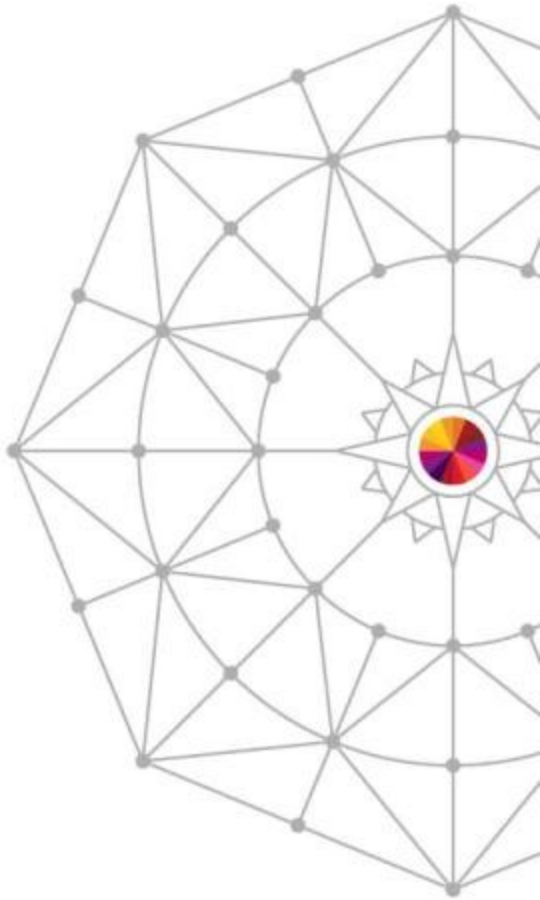
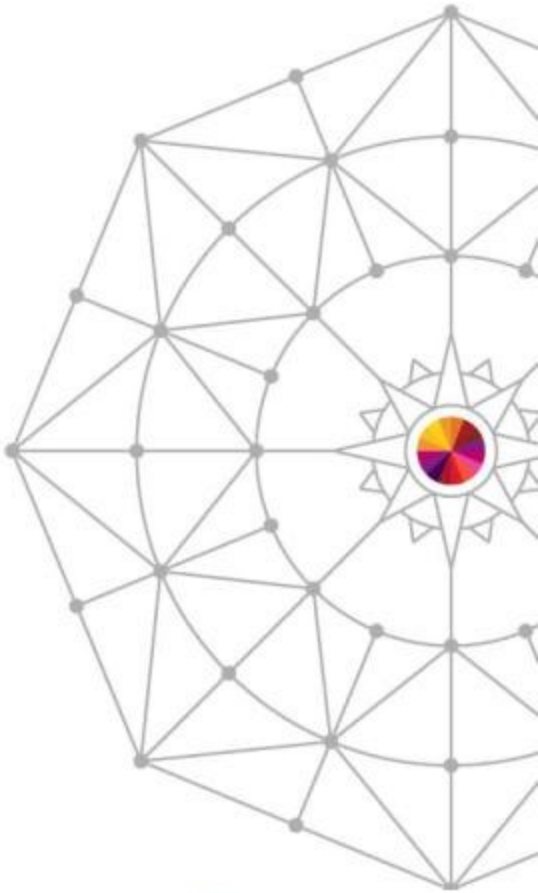


Comparison of system states after changes

- Migrate from TPF4.1 to z/TPF
  - Mills/msg change within 10%?
- Processor upgrade from z196 to EC12
  - MIPS increase inline with ITRRs?
- New TPF application loaded
  - Effects on the system small?



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Comparison of Means

- Items of interest
  - Probability distribution of workload generated values
    - Reasonable assumption this is normal(Gaussian)
    - important for upcoming calculations
  - Variance of the workload
    - a parameter generally out of our control
    - but it will be known constant
  - Width of confidence interval
    - management pressure to make it small
  - n= sample size of observations
    - we can control this

True mean difference vs the sample mean difference

$100(1-\alpha)$ percent confidence interval for $\mu_1 - \mu_2$

$$(\bar{x}_1 - \bar{x}_2) \pm z_{(1-\frac{\alpha}{2})} \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

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Example with small variance

$$\bar{x}_1 = 7500$$

$$\bar{x}_2 = 6900$$

$$\sigma = 65$$

$$\alpha = .05$$

$$n = 10$$

$\mu_1 - \mu_2$ is contained in $(7500 - 6900) \pm 1.96 \sqrt{\frac{65^2}{10} + \frac{65^2}{10}}$

$$= 600 \pm 57$$

$$\Rightarrow (7.24\%, 8.87\%)$$

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Example with variance large

$$\bar{x}_1 = 700$$
$$\bar{x}_2 = 650$$
$$\sigma = 70$$
$$\alpha = .05$$
$$n = 10$$

$\mu_1 - \mu_2$ is contained in $(700-650) \pm 1.96 \sqrt{\frac{70^2}{10} + \frac{70^2}{10}}$

$$= 50 \pm 61.3$$

$$\Rightarrow (-1\%, 15.9\%)$$

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Increasing n to counter larger variance

$$\bar{x}_1 = 700$$
$$\bar{x}_2 = 650$$
$$\sigma = 70$$
$$\alpha = .05$$
$$n = 40$$

$\mu_1 - \mu_2$ is contained in $(700-650) \pm 1.96 \sqrt{\frac{70^2}{40} + \frac{70^2}{40}}$

$$= 50 \pm 30.7$$

$$\Rightarrow (3\%, 12\%)$$

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Issues with increasing n

- n=10
  - Monday to Friday once per day at 2PM
  - 2 weeks before and after
- n=40
  - Measure 4 times per day
    - Perhaps 10AM,11AM,2PM,3PM
    - Before cutover check that all these times have similar means/variances to 2PM measurement
  - Measure once per day 8 weeks before and after
    - Issues with trend
      - generally increasing mean
    - changing distribution over time
      - Program loads
      - weather events
      - seasonal effects Detecting/removing outliers
    - Final result is delayed

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Paired comparisons

- Pairing can be a powerful tool in variance reduction
- Pairing observations has intuitive appeal
- However pairing can actually hurt
  - See ‘On Kangaroos and Cookies: Models for Paired Designs’ by David A. Freedman
- If correlations between the pairs is small
  - consider just sampling from the whole population
  - less total time since sample more quickly
  - e.g. only Monday to Monday not efficient in this case

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Significant changes in 4K Frame Usage from TPF4.1 to z/TPF

- In z/TPF PPA,ECB Heap,ECB Stack replace corresponding TPF4.1 4K frame usage

- z/TPF residual 4K usage
  - In flight IO
    - e.g. 300 ECB x 4K = 1.2M
  - COWs
    - fraction of active ECBs
  - Utilities
    - Consider completion time requirements
    - use Lodic to control frame consumption
  - Buffers for tape writes

Detecting and responding to distressed tapes

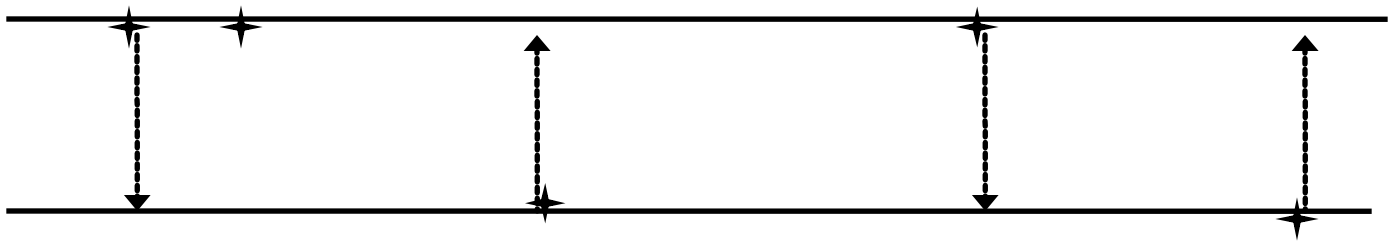
- Previous behavior
  - Lost interrupt detection threshold is 16 seconds
    - Kill the operation
    - Causes tape switch or job failure
      - Depends on tape macro/options
- Dynamic missing interrupt handler(PJ39803)
  - 1 second granularity
  - Calls user exit – parameters of interest
    - Passed values
      - Tape queue
      - Tape name/macro
    - Can call to other routines to collect
      - SWB and Frames used
  - Inside user exit can
    - Keep waiting
    - quit
  - The SWB and the 4K frame are queued
- Potential to cause large queues
  - Tape logging
  - High tape rate utilities

Configuration

- Strong suggestion
  - have active and standby tape on different CUs
- This will generate almost sure independence
  - Same CU can have failure correlation approaching 1
    - Several recent customer examples

Fruits of Independence

- Even with a fairly high anomaly rate of HW we can achieve large mean time to dual failure
- Independence assumption is critical
  - Between tapes
  - After failure tape is replaced and has same lifetime distribution as before
    - renewal process



Future TUG talks

- Contact me with topic suggestions
  - Generally like somewhat broad appeal for talks
  - Specific issues/concerns are welcome
    - If some generality then a Hot Topic
    - Otherwise addressed individually
- rab1@us.ibm.com

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Notes

- Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.
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