TPF Performance Metrics:
Using The TPF ITRR Tables

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What Are "ITRRs" ?

TPF ITRRs are a tool to used to help with the capacity and performance planning for TPF systems.

TPF ITRRs are conceptionally similiar to IBM's "LSPRs" for z/OS™, for OS/390™, and for other systems.

TPF ITRRs are specific to TPF workloads.

Why Use The TPF ITRRs?

❑ Perhaps you need to determine which CPU to purchase to handle the workload for the next few years.

❑ Perhaps you want to determine the impact of a pending software change to your system.

❑ Such requirements require an understanding of the expected capacity of one or more processors.

This is when you would use the TPF ITRRs.

Why Not Use MIPS to Select a CPU?

MIPS : Millions of instructions per second

General MIPS ratings of CPUs may not apply to TPF:

they do not take into account the TPF instruction profile

they are based on other operating systems.

It is unlikely that they represent YOUR workload.

What Is An ITRR ?

- ITR : Internal Throughput Rate
- ITRR : Internal Throughput Rate Ratio

- TPF System A's data reduction reports reports 646 weighted transactions per second at a measured utilization of 85%.

- The ITR of this workload is : 646 / .85 = 760.

- It may help to think of this as the number of transactions that this processor can process at 100% utilization.

- This is a theoretical number, your actual results will be different.

What Is The System Growth Expectation ?

- TPF System A expects a 15% growth per year in the previously stated transaction rate per year. Corporate standards suggest replacing a CPU in no less than 3 year cycles and to target a maxiumum average of 85% utilization.

- Assume no change to pathlength.

- Will my CPU still handle this workload in 2007 ?

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Will The CPU Handle The Load ?

- 646 trans/second * 1.15 * 1.15 * 1.15 = 982 transaction per second.

- The current CPU's "maximum capacity" is 760 trans per second.

- 982 > 760.

- No, the current processor will not handle the load.

How Large Of A CPU Is Needed?

- 982 transaction / second at 85% utilization is an ITRR of 1155 transaction per second.

- 1155 / 760 = 1.52.

- We need a CPU that is 1.52 times the "size" of my current system to handle 3 years growth.

- In other words, the <u>ratio</u> of the capacity of the system needs to be at least 1.52 times greater than my current system.

TPF's Workloads

- The TPF ITRRs are a publicized list of the expected ratios of various CPUs for 3 specific workloads.

- Analysis has shown that the achiveved throuput of the system tends to be related to the amount of I/O the system performs.

- TPF 4500   : 4500 instructions between physical I/O.
- TPF 8000   : 8000 instructions between physical I/O.
- TPF FQ   : TPF Fare Quote workload

TPF ITRR Tables

Model	4500	8000	Fare Quote
2064-101	8.07	8.37	9.80
2064-102	14.60	15.50	18.51
2064-1C1	8.37	8.76	10.15
2064-1C2	15.30	16.39	19.41
2064-2C1	9.90	10.40	12.08
2064-2C2	18.02	19.50	23.12
2084-301	14.70	15.30	17.77
2084-302	26.73	28.56	33.96

Using The TPF ITRRs On The Workload.

- The current machine is a z/900 101.
- We'll pick the "average" workload model.
- So the current CPU is rated to be 8.37

- We need a CPU with at least 1.52 x the current CPU.
- So the requirement is for a processor that is rated at:
  - ► 8.37*1.52 = 12.72.

- Reviewing the table on the prior page:
  - ► 2064-102 is ok (as long as your workload runs tightly coupled).
  - ► If you cannot run tightly coupled:
    - − The 1C1 and the 2C1 will not be our solution.
    - − The ITRR of the 301 is 15.30, or about 20% more than needed, but the closest single engine match.

What Can The Recommended CPU Handle ?

- The 301 is 20.28% larger than required. How much can it handle ?

- 15.30 (301's ITRR) / 8.37 (101's ITRR) = 82% growth.

- The current ITR of the workload on the 301 is 760.

- The new CPU could handle 1.82*760=1383 trans/second,
- or it could handle 1383*.85=1176 trans/second at 85% utilization.

- or

- The new CPU will run 760 trans/second at 760/1383=55% utilization.

So How Do You Select A CPU ?

- Which do you select?

- This depends on other factors:
  - ► Price
  - ► Workload consolidation
  - ► LPAR overhead
  - ► Corporate guidelines and mandates
  - ► Accuracy of historical planning
  - ► Processor function
  - ► etc.

What Do I Do If ...

- I am not running an airlines Reservations 8000 instruction between I/O workload...

- Monitor activity over time and track your actual results to the TPF workloads and decide which one appears to be the best.

- And of course, contact IBM for help.
  - ► The math is easy.
  - ► The nuances are hard.

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Last Thoughts

- **PR/SM™ overhead**
  - ► PR/SM overhead is not included in the TPF ITRRs for processors prior to the z990™.
  - ► Dedicated PR/SM overhead is built into the z990 ITRRs.
  - ► Shared PR/SM overhead is **not** built into the z990 ITRRs.

- **Other vendor CPUs**
  - ► TPF does not publish ITRRs for other vendor CPUs, please contact IBM to help perform analysis on such migrations.

- **Where do I get the TPF ITRRs**
  - ► eventually - http://www.ibm.com/tpf.
  - ► for now - speak to your TPF Customer Service Representative.

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