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HARDWARE BENCHMARKING APPLICATION

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Abstract - *The main reason for using a computer is to act fast. This is why performance measurement is taken so seriously by computer customers. Although performance measurement usually compares only one aspect (speed) of a computer, this aspect is often effective. Generally, a mainframe customer can run specific applications on a new machine before purchasing it. With microprocessor-based systems, however, original equipment manufacturers must make decisions without detailed knowledge of the end user's code, so performance measurements with standard benchmarks become more important.*

This project presents benchmarking techniques for estimating configurable computing systems. An important goal of this technique is to provide a benchmark that exposes more and more information about both the infrastructure, equipment, and architecture of a configurable computing system. The intention of these benchmarks is not to compare fully to competing architectures, but to provide information about the specific properties of configurable computing systems. Single core, multi core, is sufficient enough to test a computer to its knees on aspects of graphics processing and RAM computation speed.

Key Words: HBT, CPU, RAM, GPU.

1. INTRODUCTION

Ever since the introduction of modern day computing, engineers and developers have been trying to squeeze every ounce of performance into their devices. However how do we test for performance? What quantitative measurements can be made to justify the superiority of one device over another? These questions are of the type intended to be answered. In this project, we investigated the performance capabilities of current-generation multiprocessor hardware. Through looking at multicore CPUs, general purpose GPU computing, and an FPGA, we compared device capabilities to determine which future investments should be focused on and why.

In computing, a benchmark is the act of running a computer program, a set of programs, or other operations, in which several standard tests and tests are normally run to assess the relative performance of an object. The term benchmark is also commonly used for the purposes of elaborately designed benchmarking programs.

Our benchmarking approach addresses a broad range of configurable architectures and issues existing approach. We are looking at configurable architectures, including single configurable devices, multiple configurable devices, and mixed architectures, such as fixed-plus-variable devices and hybrid systems. In addition, we are addressing issues such as reconfiguring run-time, which is an important aspect of the configurable architecture.

Benchmarking is usually associated with assessing the performance characteristics of computer hardware, for example, CPU's floating point operation performance, but there are situations when the technique is also applied to software. For example, software benchmarks are against the compiler or database management system (DBMS). Benchmarks provide a way to compare the performance of different subsystems in different chip / system architectures. The various operations involved in hardware or CPU benchmarking are as follows:

i. 32-bit CPU processing

i. 64-bit CPU processing

ii. Storage drive speeds

iii. RAM

iv. Thermal analysis

v. GPU(Rendering)

2. LITERATURE SURVEY

[1] Benchmarking Technology for Configurable Computing System

This paper presents benchmarking techniques for estimating configurable computing systems. An important goal of this technique is to provide a benchmark that exposes more and more information about both the infrastructure, equipment, and architecture of a configurable computing system. The intention of these benchmarks is not to compare fully to competing architectures, but to provide information about the specific properties of configurable computing systems. The benchmarking technique takes advantage of the work done in the C / sup 3 / I Parallel Benchmark Suite (C3IPBS) program, which addressed the development of a suite of benchmarks for various C / sup 3 / I applications on different standard machines.

[2] .**R. Weicker, "An Overview of Common Benchmarks"**

Whetstone, the first published benchmark, has been used by BOINC for characterizing single precision or double precision performance for floating-point numbers. Many statements of the benchmark have been suppressed due to the optimization strategies followed by the compilers during code generation, which affects the performance results.

[3] S. Niemela, "PCMark 05: PC Performance Analysis", Whitepaper, Futuremark Corporation, June 2005.

PCMark characterizes the performance of a typical home computer taking into account four task categories: Productivity, Internet, Entertainment and General . The results may not represent the performance for "number-crunching"

[4] Benchmarking of High Performing Computing Clusters with Heterogeneous CPU/GPU Architecture

Modern benchmark tests are oriented either for CPU or for specific co-processor calculations but not in a whole thing. This paper is dedicated to describe an approach to build a unified performance test for a heterogeneous cluster with CPU/GPU computing nodes.

[5] Benchmarking the Powering Computations for Application Tuning

Powering is an important operation in many computationally intensive workloads. This paper examines the performance of various styles to calculate power operation from application level. A series of small benchmark codes that calculate the operation of electricity in various ways. Their performance is evaluated on Intel Axon CPUs under the Intel compilation environment. The results show that the number of floating-point operations and the corresponding runtime exponents are sensitive to the value of Y and how it is used.

[6] How to Benchmark Supercomputers

Benchmarks on a particular type of workload to help users make their decision to buy or use machines to compare platforms, identify performance bottlenecks, evaluate potential solutions, and best fit the needs of their application Designed to mimic a particular type of workload. In this paper we discuss the purpose, importance, and method of benchmarking supercomputers, describe the state of the art, and review five of the mainstream benchmarks for evaluating supercomputers, among them, the famous linepack The TOP500 ranking is the most popular for the list. Additionally, HPCG is the benchmark, aiming to emphasize floating point operation speed and balance of communication bandwidth and latency, the Rodinia benchmark for evaluating heterogeneous supercomputers made up of both GPU and multi-core CPUs, the specific benchmark being the higher -Display can be applied to the latest generation of computers.

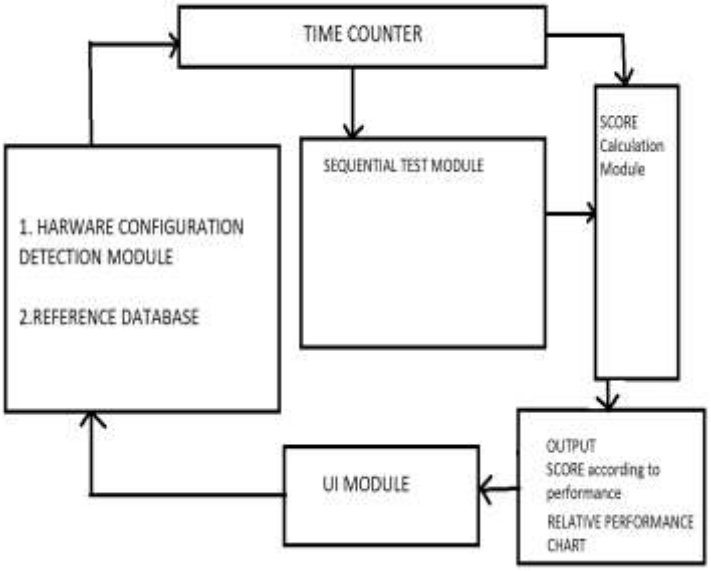
3. PROPOSED SYSTEM ARCHITECTURE

The entire working of the tool revolves around this base architecture.

The function is represented as a result of analysis done as an instance of how much time each task will take to complete. This time is one universal counter which will run in the background compulsorily.

The hardware detection module has only one significance for detecting the minimum required hardware available in order to run the tool. The digital signatures are also taken by this module for information display. The output given by the tool is the score calculated sing the time counter significance. The output will be in the form of a score which will be just an average score of all the scores noted after each sub computation.

There will also be one Relative Performance List which will basically have a relative position depiction relative to other standard results of various configurations.



The working of the architecture is as follows:

Reference Database: A functional or non functional database that will be used for referencing for the corresponding average score after testing to give a clear view of performance ranking. Also this database will be used for compatibility check at the beginning.

Global Time Counter: A global time counting method that will return per process time difference value equal to to each corresponding process completion time.

Sequential Test Module: The collection of all the processes to be executed in an optimal sequence ensure unbiased test results.

Score Calculation Module: The module that will take all the individual scores corresponding to each process and will take an average score that will be returned for the reference database for ranking.

Relative Performance Chart (Output): The output score after testing along with a reference chart referenced from the reference database in order to give a relative performance idea as a result.

UI Module:The graphical user interface that is intended to be as user friendly as possible to make things for the end user.

4. FUTURE WORK

For future projects similar to this one, there will be a broad spectrum of benchmarks capable of running on all three platforms to focus on core topics as well as possibly looking at new technologies, such as Accelerated Processing Units (APUs). Testing a single benchmark using multiple platforms for benchmarking or speedup of clusters will also be used in future research..

In this tool subsequent updates can be made for newer hardware compatibility releasing in the future. The present as well as the legacy results can be recorded for future referencing. The peak performance threshold will always be relative in the mere future as well.

4. 5ONCLUSION

We have proposed a new light-weight benchmark - HBT for performance characterization of computing systems for real use cases. The benchmark has been designed as part of a controlled study and focuses on addressing the issue of performance inconsistency associated with the traditional benchmarks. This tool gives an absolute score corresponding to specific performance of a computer strictly based on its hardware capabilities.

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