of each of these on the performance of the application benchmarks.

The following sections of this paper describe: the parts of the machine architecture relevant to this work, small descriptions of the codes from the Los Alamos National Lab computational physics workload, the model and empirical methodology, validation of the model, results, analysis and major conclusions.

II. Origin 2000 and PowerChallenge: Architecture Descriptions

The PowerChallenge is an SMP architecture that employs a central bus to interconnect memories and processors [3]. The bus bandwidth (1.2 Gbytes/sec) does not scale with more processors. Cache coherence is maintained through a snoopy bus protocol which broadcasts cache information to all processors connected to the bus. The Origin 2000, on the other hand, is a distributed shared memory (DSM) architecture which uses a switch interconnect that improves

Four applications which form the building blocks for many nuclear physics simulations were used in this study. Previously, a performance comparison of the Origin and PowerChallenge architectures has been done usr has b dim bIsimual solvPoIblocations

Figure 1 is a pictorial description of the times in the model.

cpi

data by a least squares fit constrained such that

$$0 <= t_i <= T_i,$$

Table 1 shows the model parameters for each of the LANL benchmark codes determined from a data set of executions on the 1-MB L2 PowerChallenge. The least