SimBA: a Simulator for BOINC Applications
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SimBA is a trace-driven, discrete event simulator that accurately emulates the logic and non-deterministic behavior of BOINC, and can be used to quickly evaluate new scheduling policies.

**Challenges in Improving VC Projects**
- Designers cannot predict the effect of their decisions.
- The time to measure and compare performance would be too long.
- Problems due to testing might upset volunteers.
- Every experiment is unique and unrepeatable.

**SimBA**
- SimBA models how VC environments based on BOINC distribute, collect, and validate work-unit instances sent to volunteer computers.
- SimBA is built upon a modular framework that can easily be extended to include new features and to model a wide range of BOINC projects.

**Trace-Driven Simulator**
Trace information includes:
- Creation time
- Operating system
- Vendor
- Life span
- Average flops
- Average computation time for an instance
- Unsuccessful rate
- Valid rate
- Time-out rate

**Discrete Event Simulator**
- SimBA consists of events, entities, and resources.
- Entities are units of traffic that generate events.
- Events cause changes in the state of the simulation and may also produce new entities.
- SimBA's only resource is shared memory.

**Applicability of SimBA**
- The effectiveness of different scheduling policies can be quantified.
- The discovery of novel and more throughput efficient scheduling methodologies is facilitated.

**Evaluation**
- SimBA is a reliable tool for performance prediction of BOINC projects.
- SimBA predictions are over 95% accurate relative to the performance of a real BOINC project such as Predictor@Home.
- It is possible to test and repeat the experiments under controlled conditions.
- It is cheaper in terms of resources and time, and does not waste computing cycles donated by volunteers.