

VarSys Managing Variability for High Performance Computing

Thomas Lux

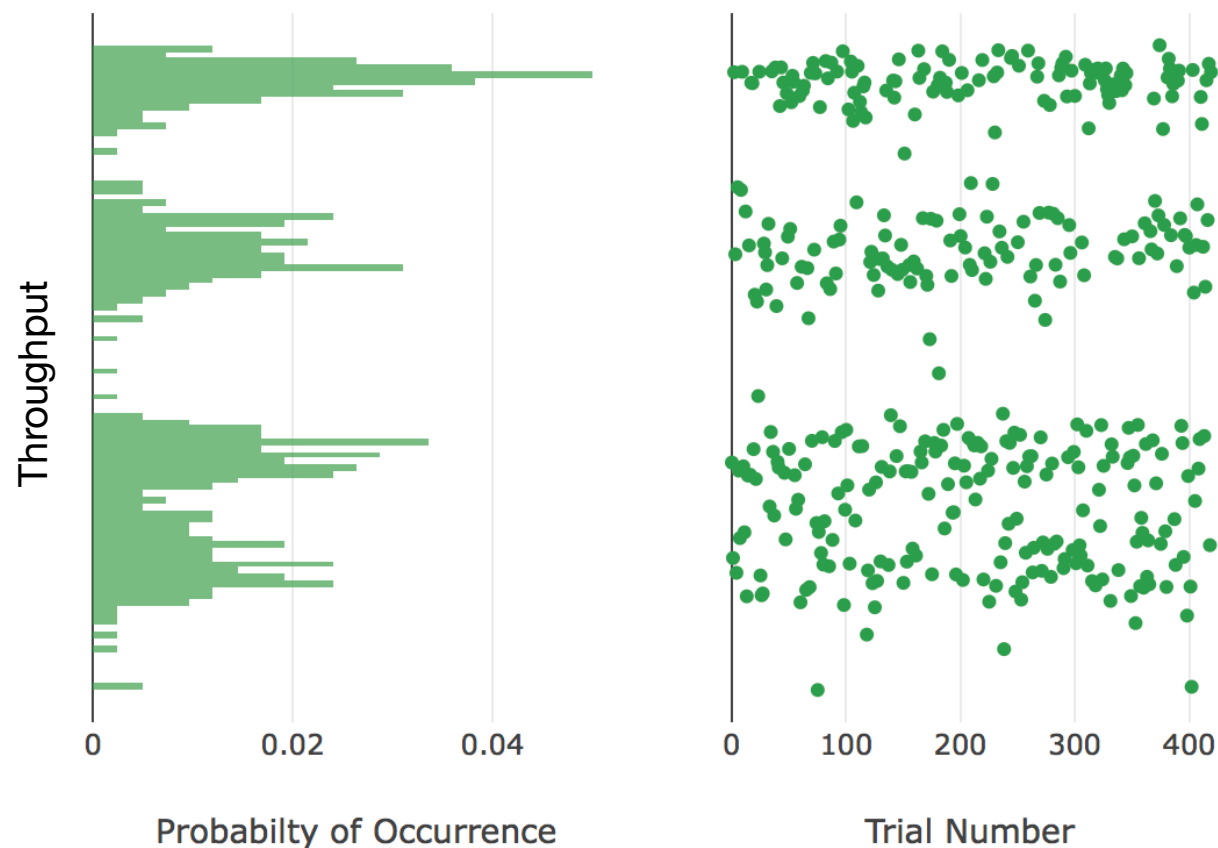


COLLEGE OF ENGINEERING
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Modeling and Analysis for HPC Systems

Computers have many interacting parts, when we run the same program repeatedly performance will vary.

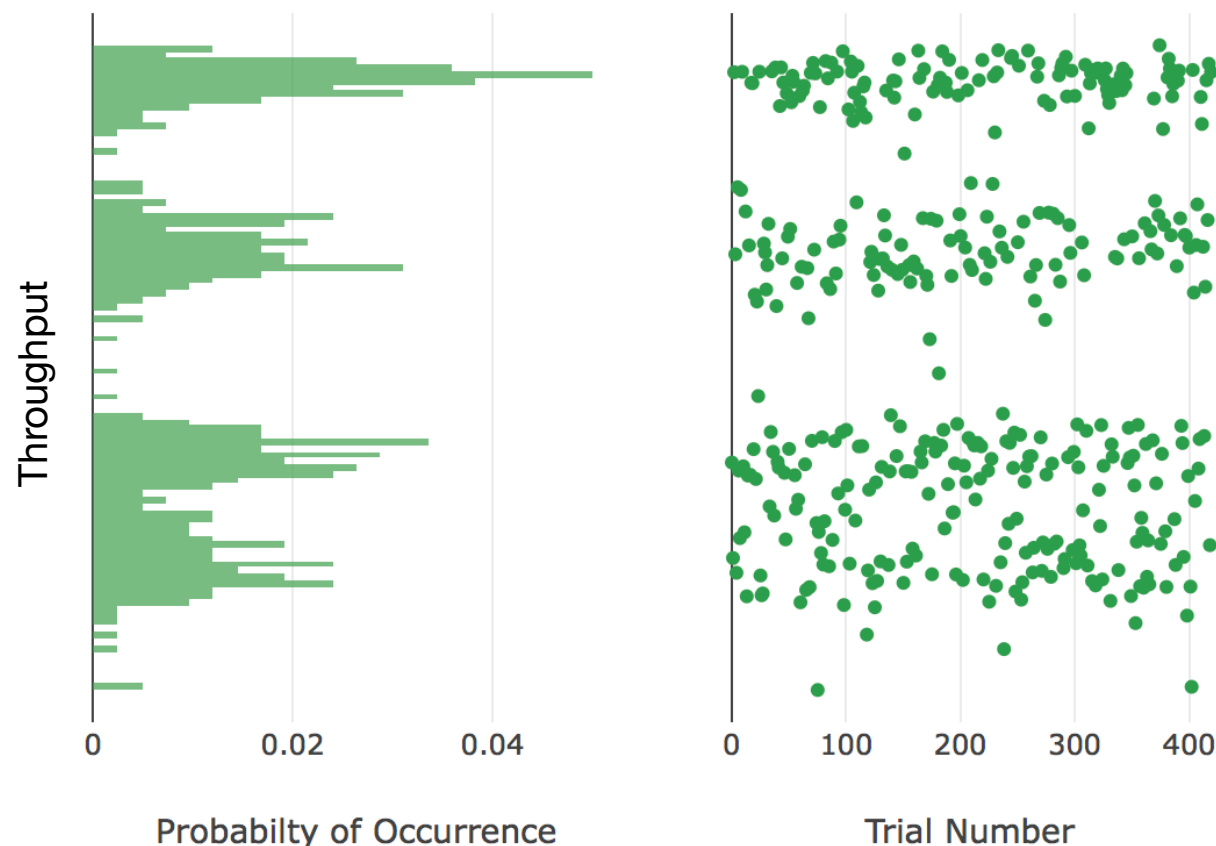
Analysis of 'True' Fsize-1024_Rsize-32



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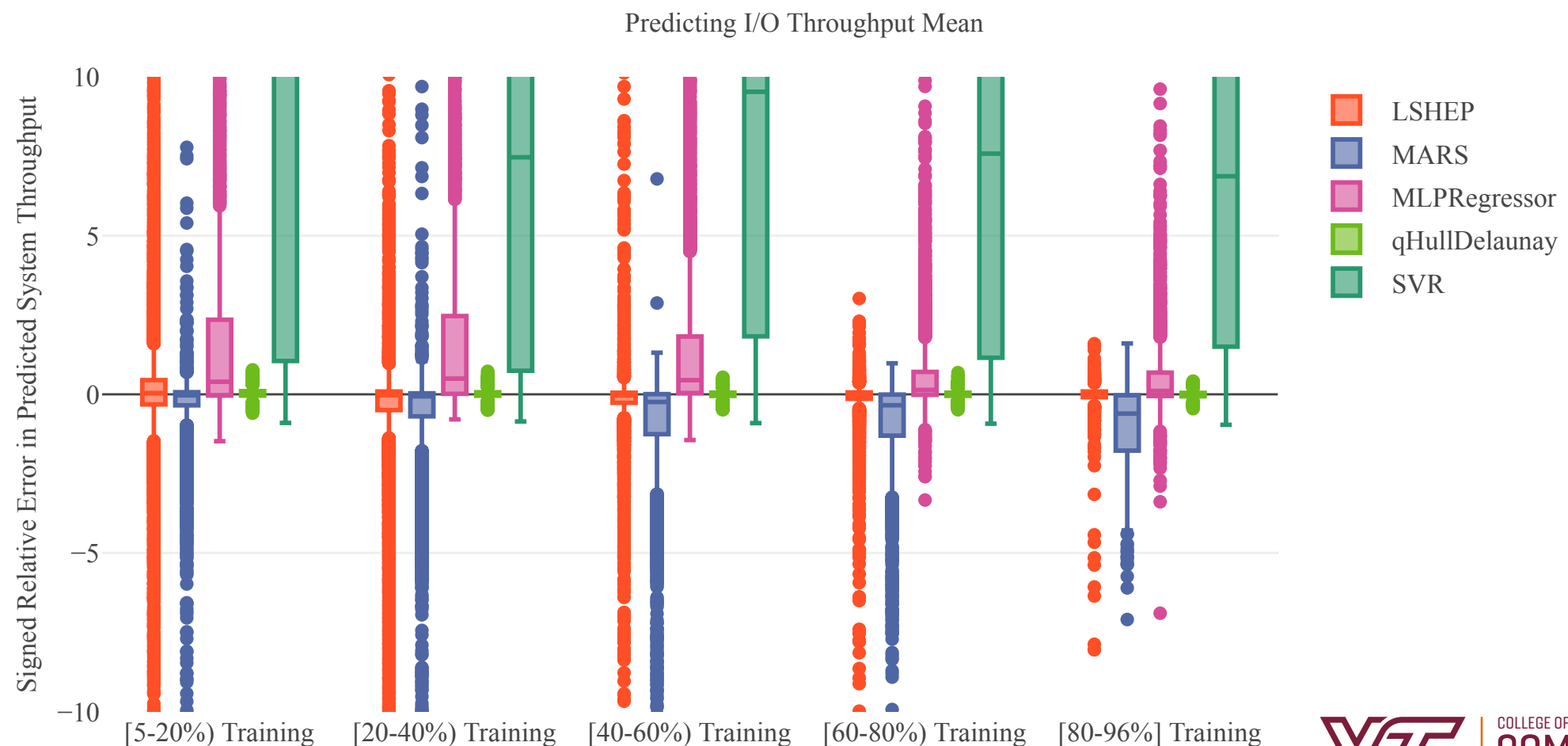
Can we predict how a computer will perform a task based on its configuration?

Can we model and predict this stochastic behavior?

We CAN Model Systems, but...

It's a hard problem that requires new methods.

Typical machine learning would use a common algorithm like neural networks, decision trees, etc..



Enter → Math Modeling

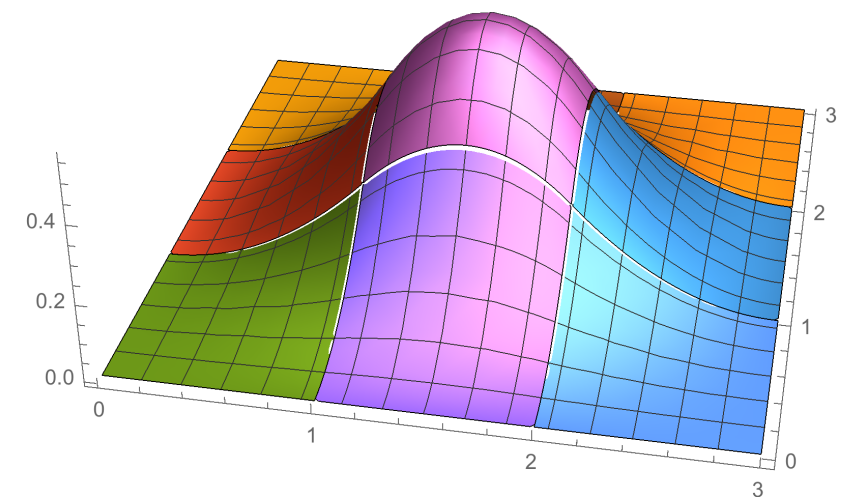
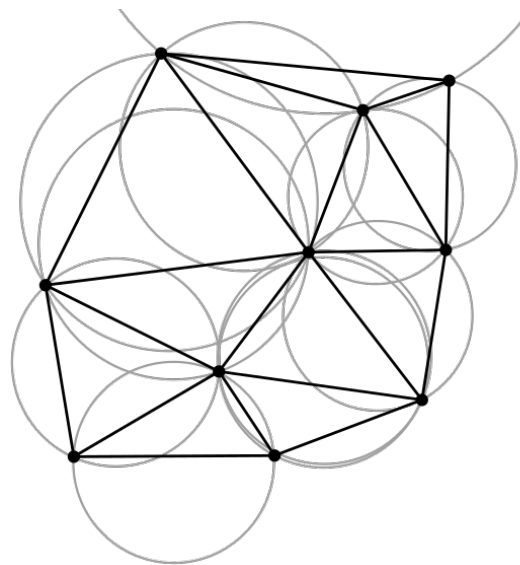
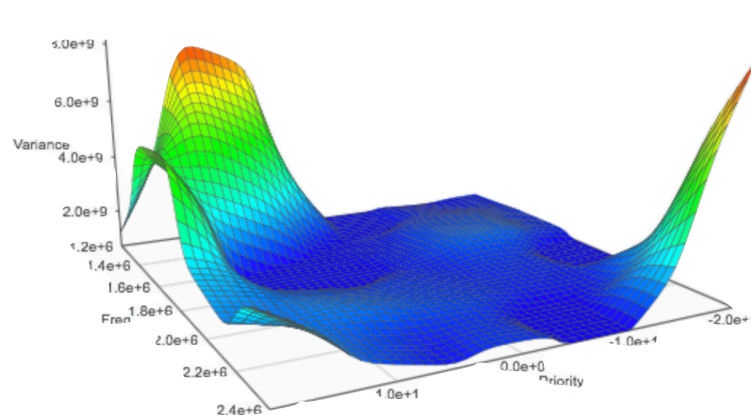
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We use deterministic methods with theoretical guarantees such as provable error bounds.

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Linear Shepard, *Delaunay Triangulation*, and *Box Splines* are three examples of deterministic interpolants.

Overarching Research Goal

Develop (or improve upon existing) techniques for **modeling the stochastic behavior** of computer systems.

