

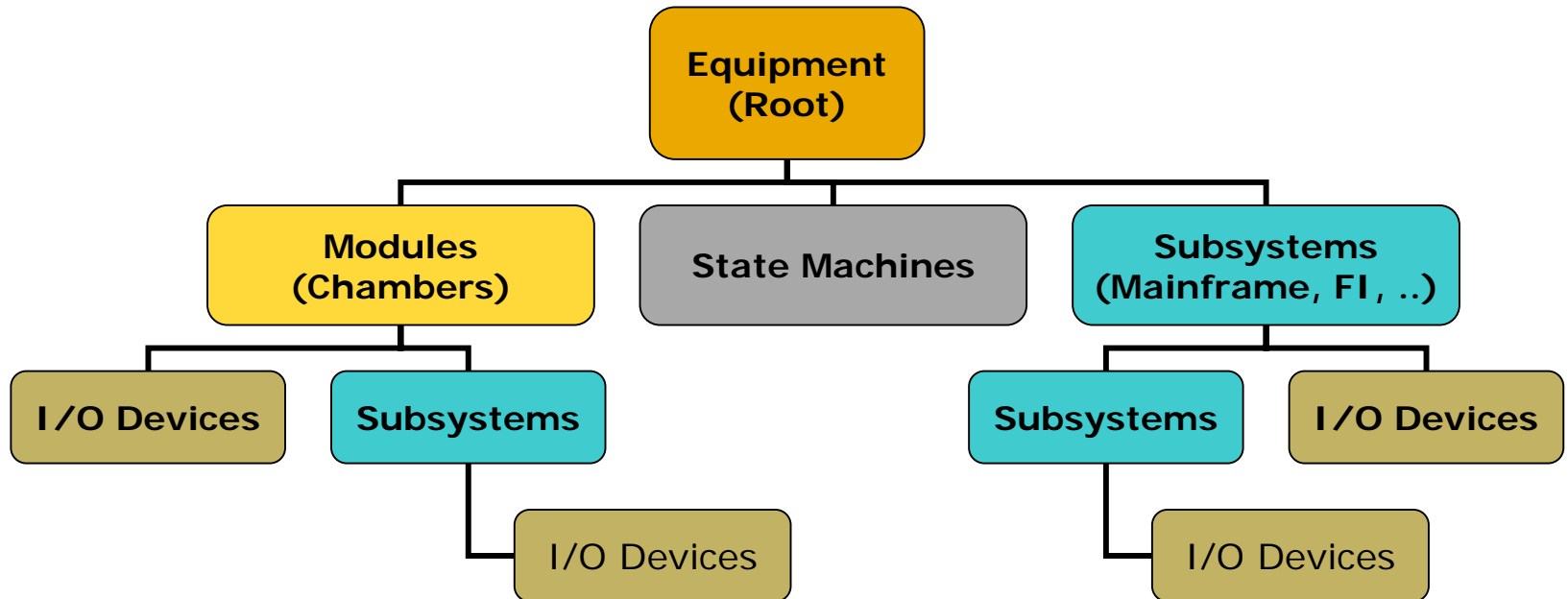
**Equipment Overview and Performance
Analysis
ISMI e-Manufacturing Workshop
SEMI CON West 2005**

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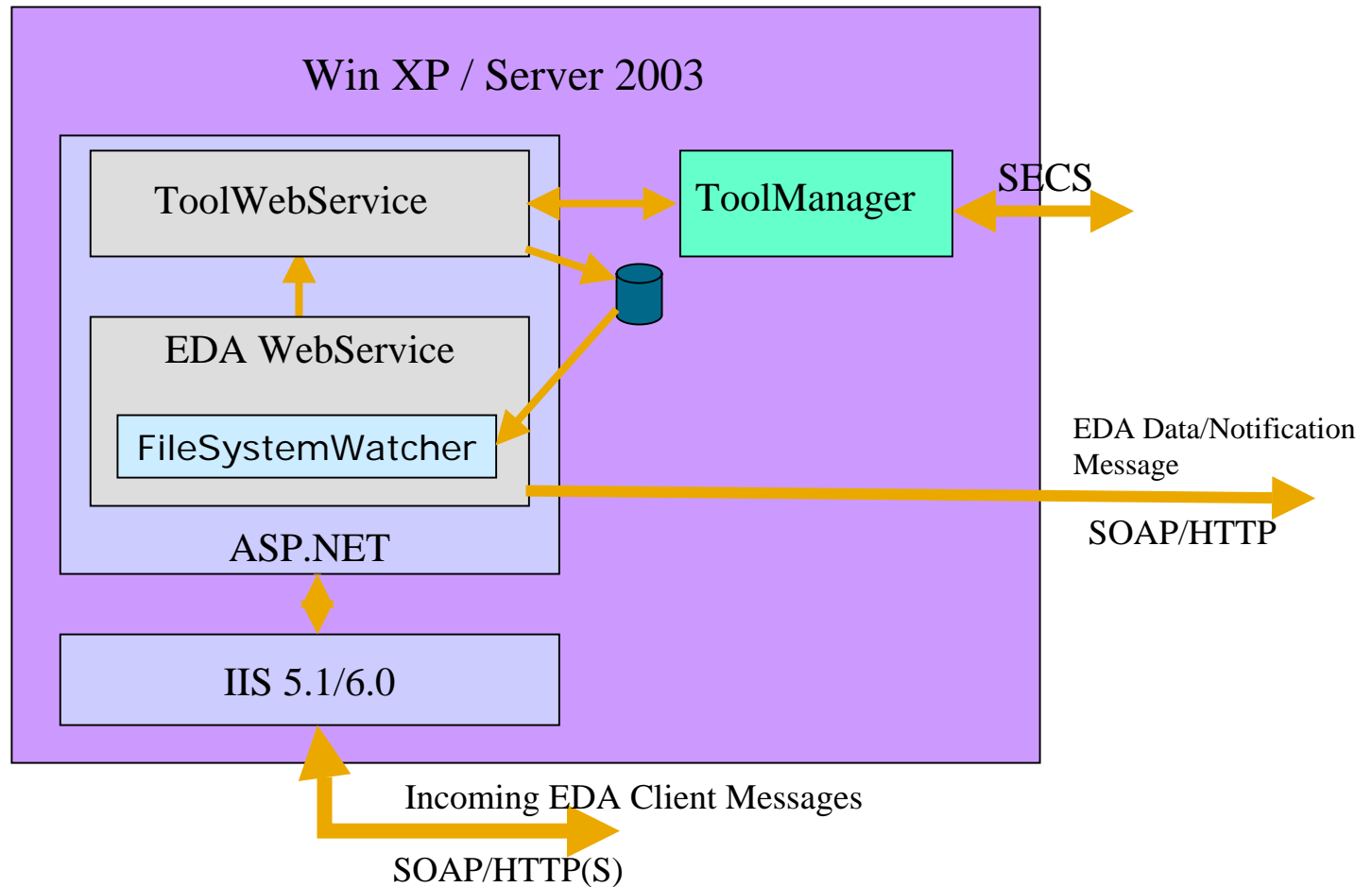
Agenda

- Equipment Implementation Overview
- Initial Performance Results
- Tuning
- Final Results
- Conclusions

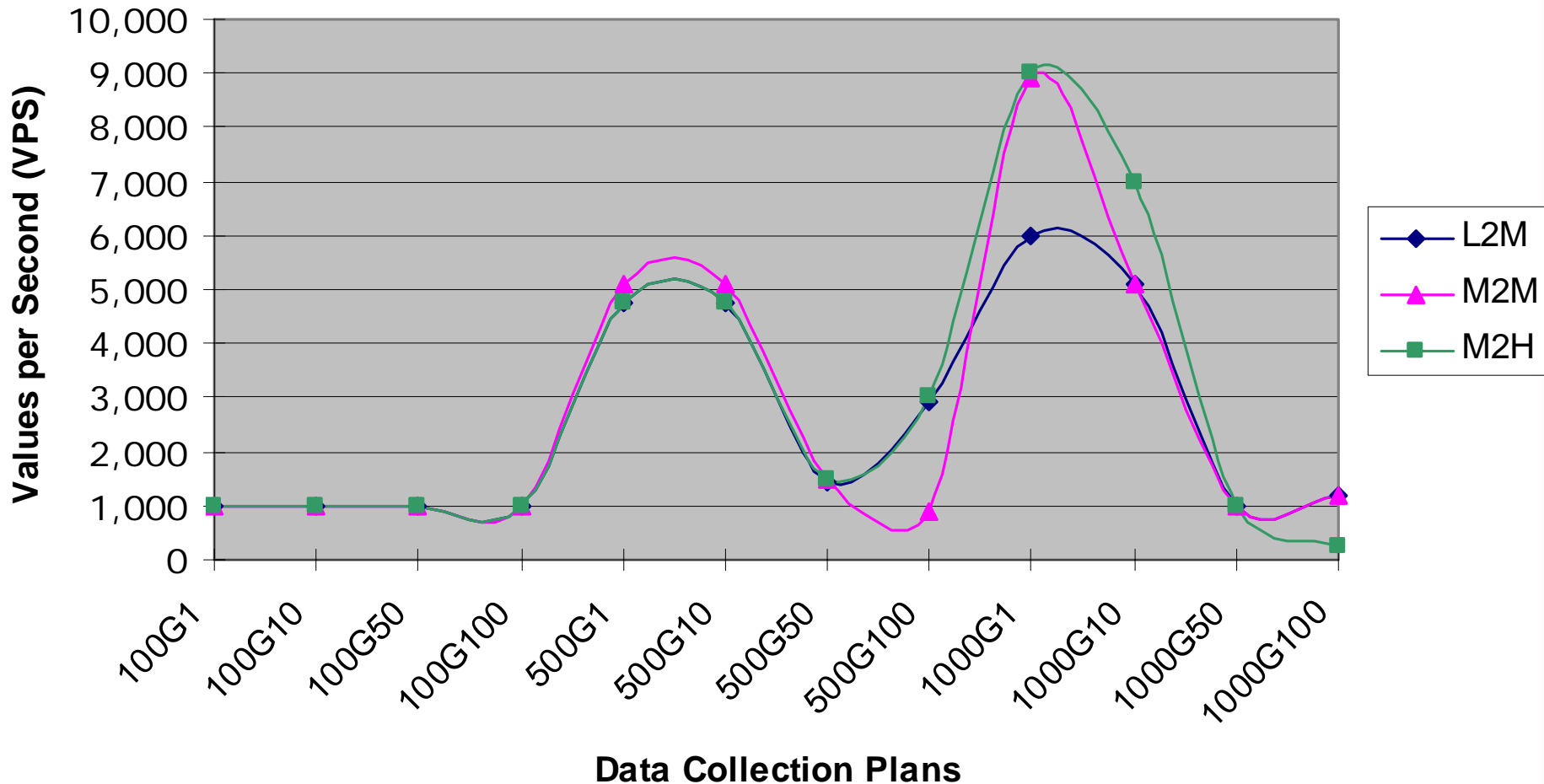
Centura Etch Common Equipment Model



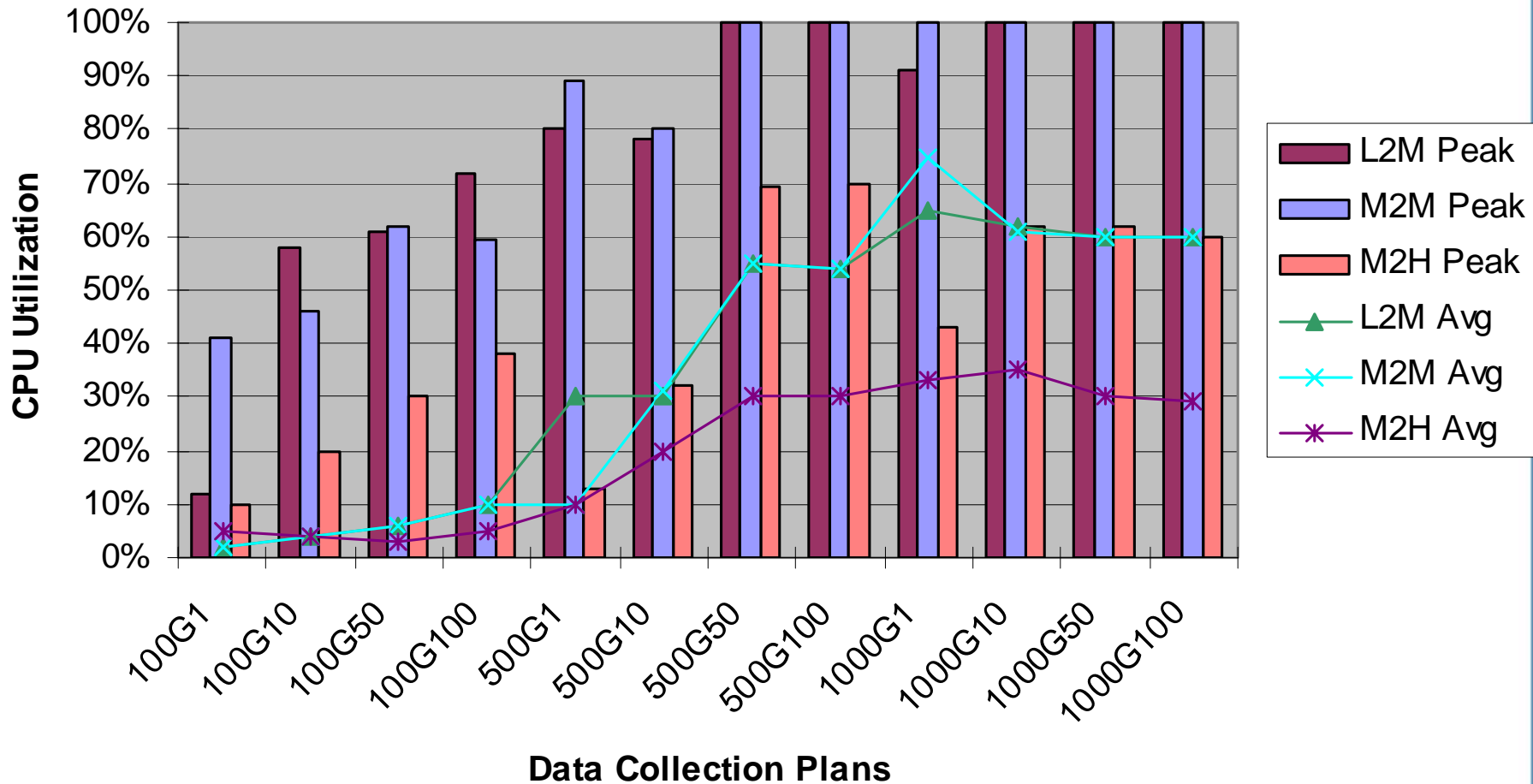
Equipment Simulator Before Test



Average Data Throughput in VPS - Initial Tests



Equipment CPU Utilization - Initial Tests



Initial Tests Summary

- Throughput performance experienced significant degradation at higher group sizes.
- Memory footprint requirements precluded running tests on machines with 256M memory or less.
- Serialization and de-serialization times at high parameter count data collection plans and high group sizes contributed $< 1\%$ of total processing time.
- Dual Xeon CPU server did not have much effect on throughput performance.

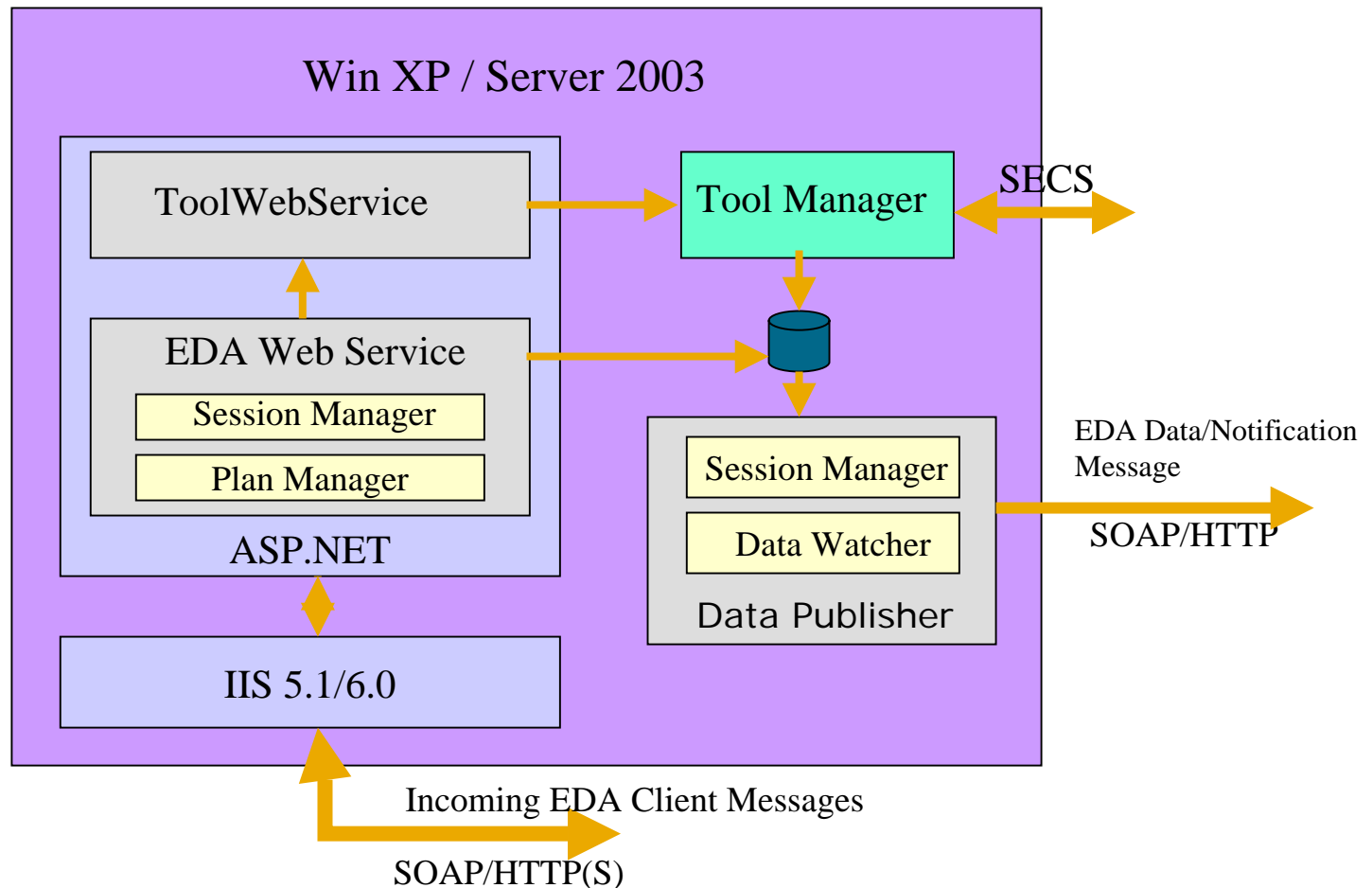
Tuning Efforts

- Removal of intermediate web service XML file reduced XML de-serialization overhead.
- Eliminated use of persistent tasks within aspnet_wp process by creating separate FileSystemWatcher process.
- Converted several temporary dynamic buffers to static to reduce effects of garbage collection. (Also, elimination of intermediate XML file reduced need for dynamic memory.)

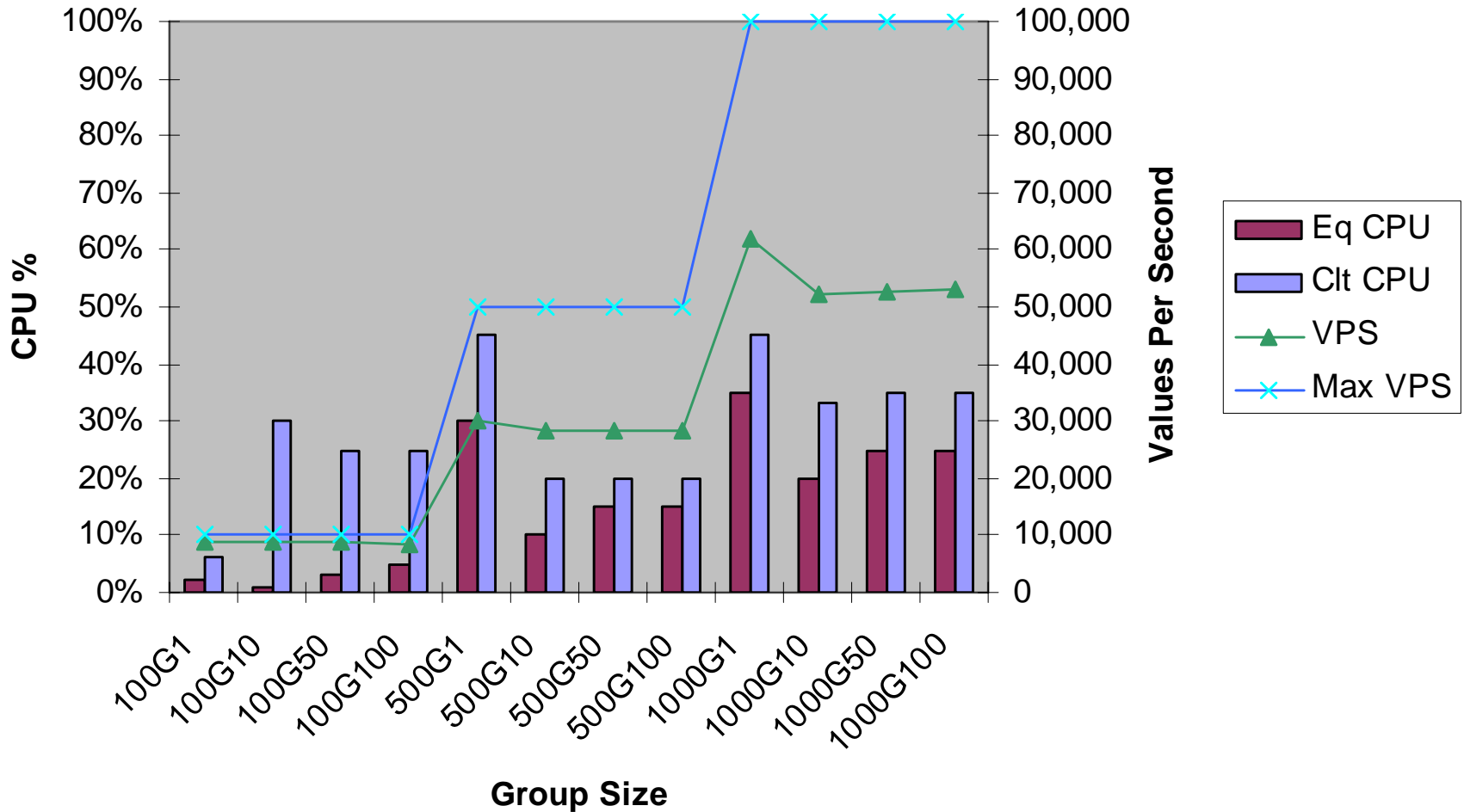
Performance Analysis

- Microsoft Windows Perfmon data provided initial performance profile.
- Trace routine from SOAP SDK used to analyze code behavior.
- Hard coded timing calls used to determine low level application performance bottlenecks.

Equipment Simulator After Tuning



Performance after Tuning



Lessons Learned

- Use design patterns and built in APIs to reduce coding requirements.
- Avoid use of persistent processes under ASP.NET.
- Reduce the effects of memory management through the use of time-stamping and caching.
- Derive proxy classes from WSDL.exe generated abstract classes rather than by modifying the generated abstract classes.

Conclusions

- Do not underestimate .NET learning curve.
- .NET platform generates robust, secure applications without impact on execution performance.
- .NET platform provides significant opportunities for achieving aggressive performance objectives.
- Throughput limited by SOAP/HTTP verbosity.



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