



ATKINS

SATURN

User Group 2007

Part 5A: Running in Parallel

Friday 19th October 2007

Plan Design Enable

Running In Parallel (part 2)

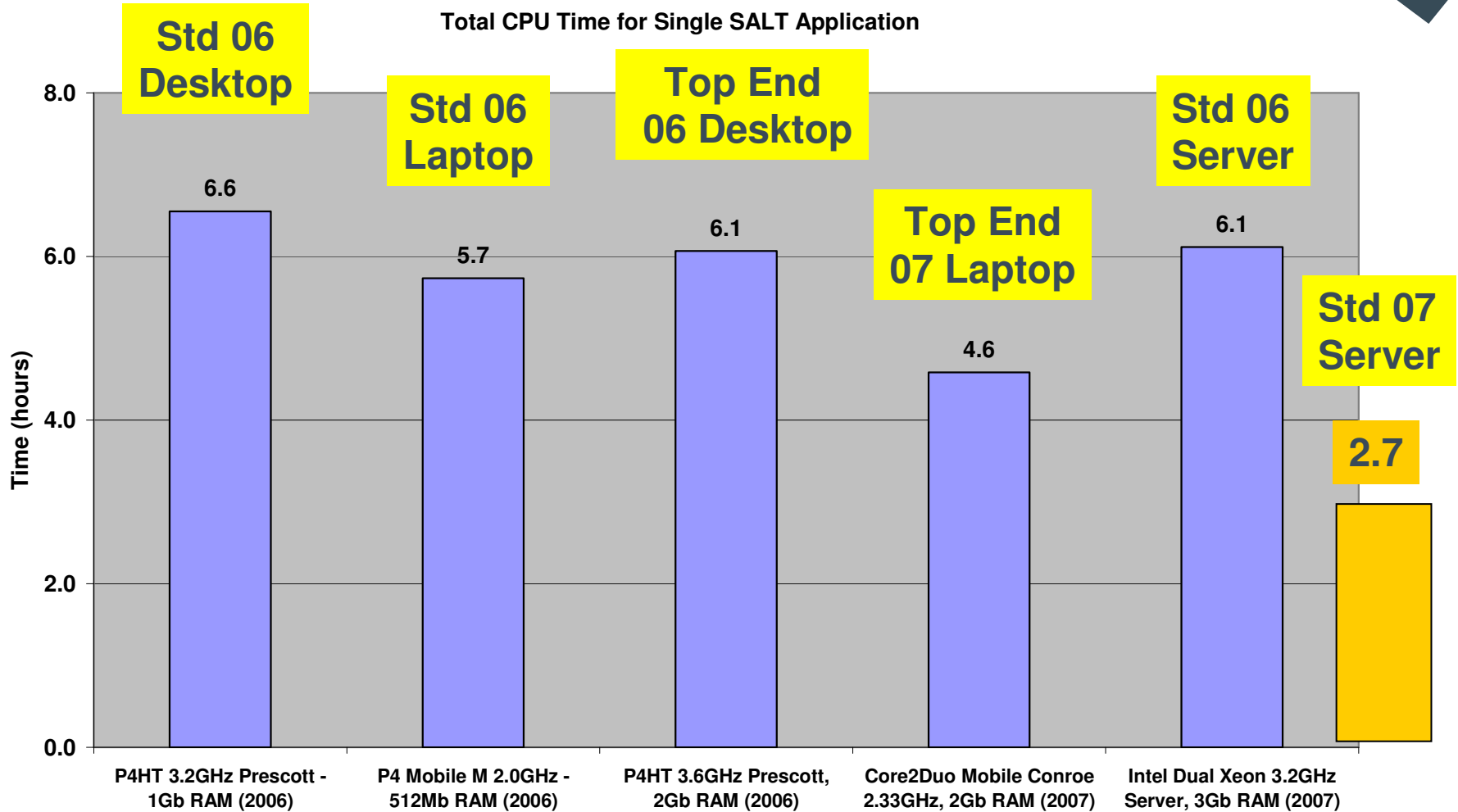
Update on Progress ...

- Further development work undertaken since UGM06
- Running tasks in parallel
 - Operations in parallel – already available
 - Within software application – early 2008
- Only requirement: multi-core chip eg Intel Core2Duo (and/or Quad-core)
- How do you do it?
 - Through SATWIN - simply run two assignments in parallel
 - Through batch files – use MONITOR
- And what are the benefits?
 - Original SALT Network as Test Bed (800 zones, 15000 Sim. Nodes)



Running In Parallel

Single CPU Times ...

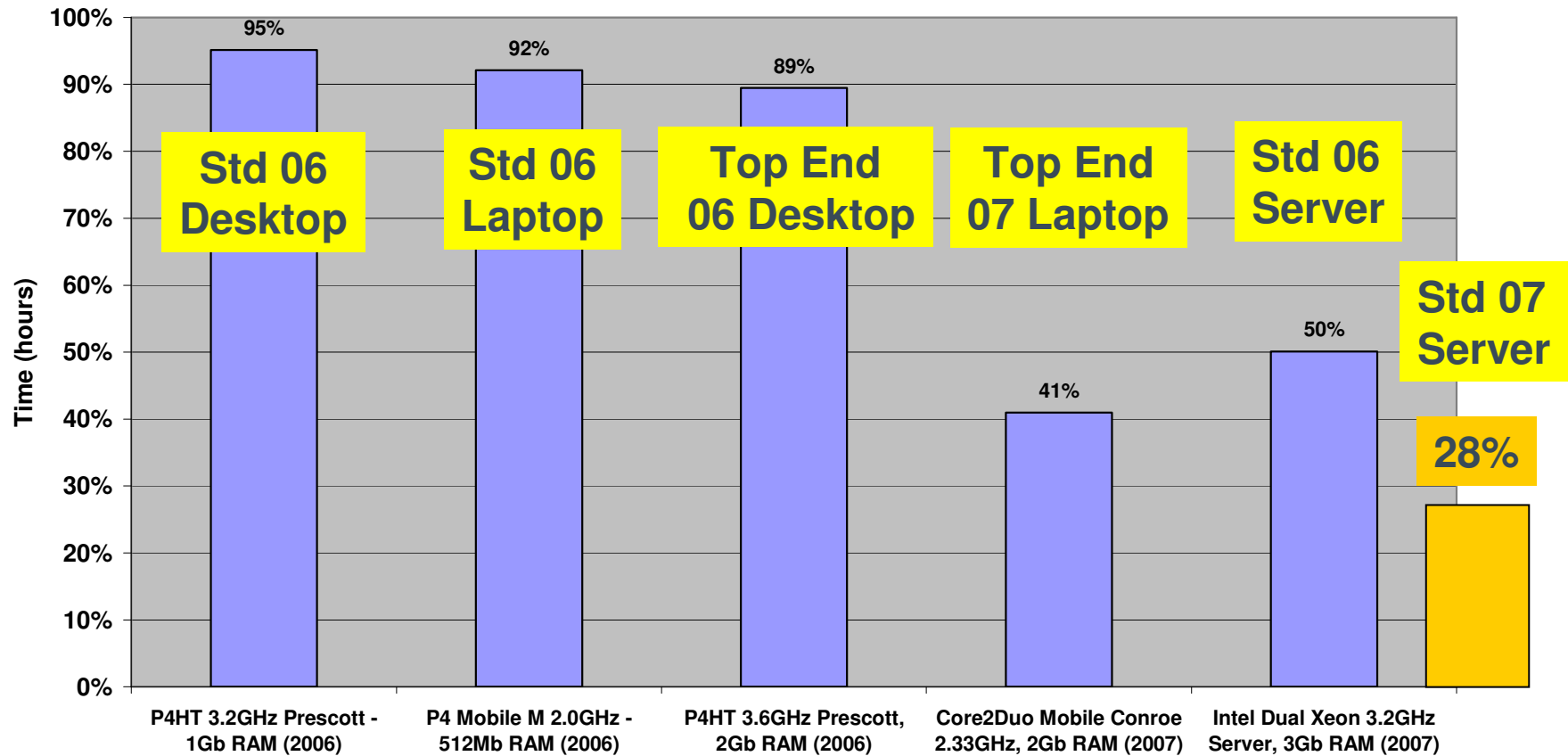




Running In Parallel

Parallel CPU Times ...

Total CLOCK Time - Two SALT Jobs in Parallel
(100% = 13.1 hrs in Sequence for Std Atkins Desktop)



Running In Parallel

Using SATWIN

- Determine the number of instances to run
- Operate as if single applications
- However, users cannot undertake a series of linked commands in sequence

The screenshot shows a Windows desktop with multiple instances of Saturn 10.6.14 Atkins running. The Windows Task Manager window is open, showing the Performance tab with CPU Usage at 100% and Physical Memory at 1.36 GB. The Processes tab shows 44 processes. Two SATWIN simulation windows are open, displaying convergence data for multiple instances.

SATWIN SIMULATION/ASSIGNMENT 29.11.05

Ass/Sim Convergence				Assignment			
ASS/SIM CONVERGENCE:	LOOP	% LINKS	AVERAGE				
< 5% GEH				6	9.939	9.1	
				7	9.320	8.1	
				8	8.015	7.1	
				9	8.539	6.1	
				10	7.952	5.1	
				11	7.433	5.1	
				12	6.465	4.1	
				13	6.473	4.1	
				14	6.395	4.1	
				15	5.615	3.1	
				16	5.637	3.547	
				17	4.657	3.125	
				18	6.745	3.223	
				19	3.525	2.763	
				20	6.372		
				ASSIGNMENT: 3			
				ITER	LAMBDA	DELTA	
				1		12.106	
				2	7.828	8.102	
				3	7.125	6.566	

AP371hb_UFN - SALT Ntwk AH Test 7.1XL HNB FinSchOrd pre-pk
 HASL = 30 NITA = 20 NITS = 30 ISTOP = 97 PCNEAR = 5.0 KOHB

SATWIN SIMULATION/ASSIGNMENT 27.11/01

Ass/Sim Convergence				Assignment				Simulation			
ASS/SIM CONVERGENCE:	LOOP	% LINKS	AVERAGE								
< 5% GEH				6	9.939	9.534		12	0.392	9834	
				7	9.320	8.594		13	0.360	9833	
				8	8.015	7.467		14	0.324	9830	
				9	8.539	6.750		15	0.266	9832	
				10	7.952	5.993		16	0.285	9816	
				11	7.433	5.456		17	0.247	9796	
				12	6.465	4.728		18	0.216	9799	
				13	6.473	4.347		19	0.230	9793	
				14	6.395	4.113		20	0.229	9765	
				15	5.615	3.699		21	0.208	9759	
				16	5.637	3.547		22	0.208	9754	
				17	4.657	3.125		23	0.172	9740	
				18	6.745	3.223		24	0.173	9718	
				19	3.525	2.763		25	0.164	9717	
				20	6.372			26	0.193	9694	
				ASSIGNMENT: 3				27	0.190	9677	
				ITER	LAMBDA	DELTA		28	0.189	9646	
				1		12.106		29	0.196	9630	
				2	7.828	8.102		30	0.179	9582	
				3	7.125	6.566		31	0.118	12791	
				4	7.277	5.838					

AP371hb_UFN - SALT Ntwk AH Test 7.1XL HNB FinSchOrd pre-pk 27/11/01
 HASL = 30 NITA = 20 NITS = 30 ISTOP = 97 PCNEAR = 5.0 KOHBI = 3 AUTOK = F

Running In Parallel

Using MONITOR (i)

- Access through Batch file PARALLEL.BAT
- Key components – MONITOR.EXE & WAIT.EXE
 - Windows VB programs
 - **MONITOR.EXE** - Accesses main OS KERNEL32.DLL
 - **WAIT.EXE** – counts a user defined # of seconds
- In operation:
 - User selects batch files to be run & the program to be logged (eg \$SATLOOK.EXE)
 - Calls separate Command Shells for each instance
 - **MONITOR.EXE** watches for any instance of the programs running in OS Kernel
 - Returns to main batch file only once all instances have terminated

Running In Parallel

Using MONITOR (ii)

```
CONTENTS OF PARALLEL.BAT
```

```
REM Starts the first run - change parameters accordingly.
```

```
Start SATURNEXIT EPSOM98M1 EPSOM98M1
```

```
REM Waits for 5 seconds to avoid simultaneous access to SAT10KEY.DAT
```

```
WAIT 5
```

```
REM Starts the second run – change parameters accordingly.
```

```
Start SATURNEXIT EPSOM98M2 EPSOM98M2
```

```
REM Starts monitoring
```

```
START /W MONITOR $SATALL 10
```

- Worked Example
 - SATURN Demonstration Network
- Further details in Section 15.52 & Section 23
- Available in Beta from Web-based Downloader

Running In Parallel

Conclusions ...

- **Benefits readily available**
- **Running in Parallel**
 - Already available – used for TIF Greater Bristol Submission
 - Used for simultaneous assignment and subsequent skimming
 - Runtimes reduced by ~30%
 - Monitors OS Kernel:
 - Scalable – any instance, suitable for multi-cores
 - Flexible – works for any SATURN program
- **Multi-thread SATURN ... under development**
 - Minimise runtimes for a single SATURN application
 - Automatic detection of number of cores
 - Inherently more flexible
 - Focus initially on SATALL and then secondary analysis
 - Low cost add-on to SATURN – different results
 - Anticipate Beta release as part of SATURN v10.8 (Dec 07)



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Part 5A: Questions & Answers

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