

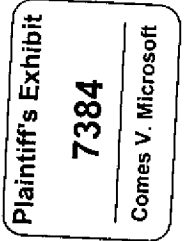
Java Runtime Project Review

Russ Arun

Charles Fitzgerald

Kory Srock

Mike Toutonghi



MSS 0048402
CONFIDENTIAL

ATTORNEYS ONLY

Delivery Vehicles

- IE4/Memphis
- SDK for Java 2.0/Inet SDK
- Mac IE (RTM Q4)
- IIS/NT5 (RTM 10/15/97)
- VJ98 (RTM 2/28/98)

MSS 0048403
CONFIDENTIAL

ATTORNEYS ONLY

Key Features

- Continued performance leadership
- New Garbage Collector
- ActiveX-Beans integration
- Capabilities-based security model
- Package management
- Debugging/profiling support
- Application Foundation Classes
- DirectX3 and Direct Animation Java wrappers
- Internationalization
- MCF
- Win32 DLL calling
- JDK 1.1 support

MSS 0048404
CONFIDENTIAL

ATTORNEYS ONLY

New Features in JDK 1.1

- Object serialization
- Reflection
- Java Beans
- Internationalization
- Security
- JAR
- JDBC
- AWT, IO, Net and Math enhancements
- Inner classes
- RMI - NOT SUPPORTED
- JNI - NOT SUPPORTED

MSS 0048405
CONFIDENTIAL

ATTORNEYS ONLY

Schedule - Beta 2

- Week of May 26 - Code Complete/Bug Bash
- Week of June 2 - Begin restricted checkins; start daily IE4 drops
- Week of June 9 - More restricted checkins; end with less than 20 P1 bugs
- Week of June 16 - Steady state of ZERO P1 bugs; fix shipstoppers only
- Week of June 23 - Build release candidates

MSS 0048406
CONFIDENTIAL

ATTORNEYS ONLY

Schedule - RTW

- August 22

MSS 0048407
CONFIDENTIAL

ATTORNEYS ONLY

Post Beta 2 Work Items

• <MIKE>

MSS 0048408
CONFIDENTIAL

ATTORNEYS ONLY

Post IE4 Work Items

- IIS requirements???
- VJ98 requirements?
- AFC Enterprise Libraries
- Disco
- Native code compilation
- Support UNIX ports

MSS 0048409
CONFIDENTIAL

ATTORNEYS ONLY

Bugs <KORY>

- Bugs stats
- Test results
- Bugs/developer
- Incoming bug rate

MSS 0048410
CONFIDENTIAL

ATTORNEYS ONLY

Test Strategy

- Comprehensive BVTs
- Applet Compatibility
 - JCK
 - SDK
 - Class Library
 - AFC
 - Disco
 - other
- VM
 - Package management
 - Security
 - COM
 - ActiveX/Beans
- Stress

MSS 0048411
CONFIDENTIAL

ATTORNEYS ONLY

Testing Synchronization

- IE4 - subset BVTs, work with Trident on applet test team
- VJ98 - debug, VM, server side
- Win CE - use our test suites
- DirectX - run their self-host tests
- IIS - run their server side suites
- Trident in Java - use some of our tests
- UW - security and verifier testing

MSS 0048412
CONFIDENTIAL

ATTORNEYS ONLY

Release Criteria - Beta 2

- <KORY>

MSS 0048413
CONFIDENTIAL

ATTORNEYS ONLY

Footprint

- Working set
- Download size
- DLL count

MSS 0048414
CONFIDENTIAL

ATTORNEYS ONLY

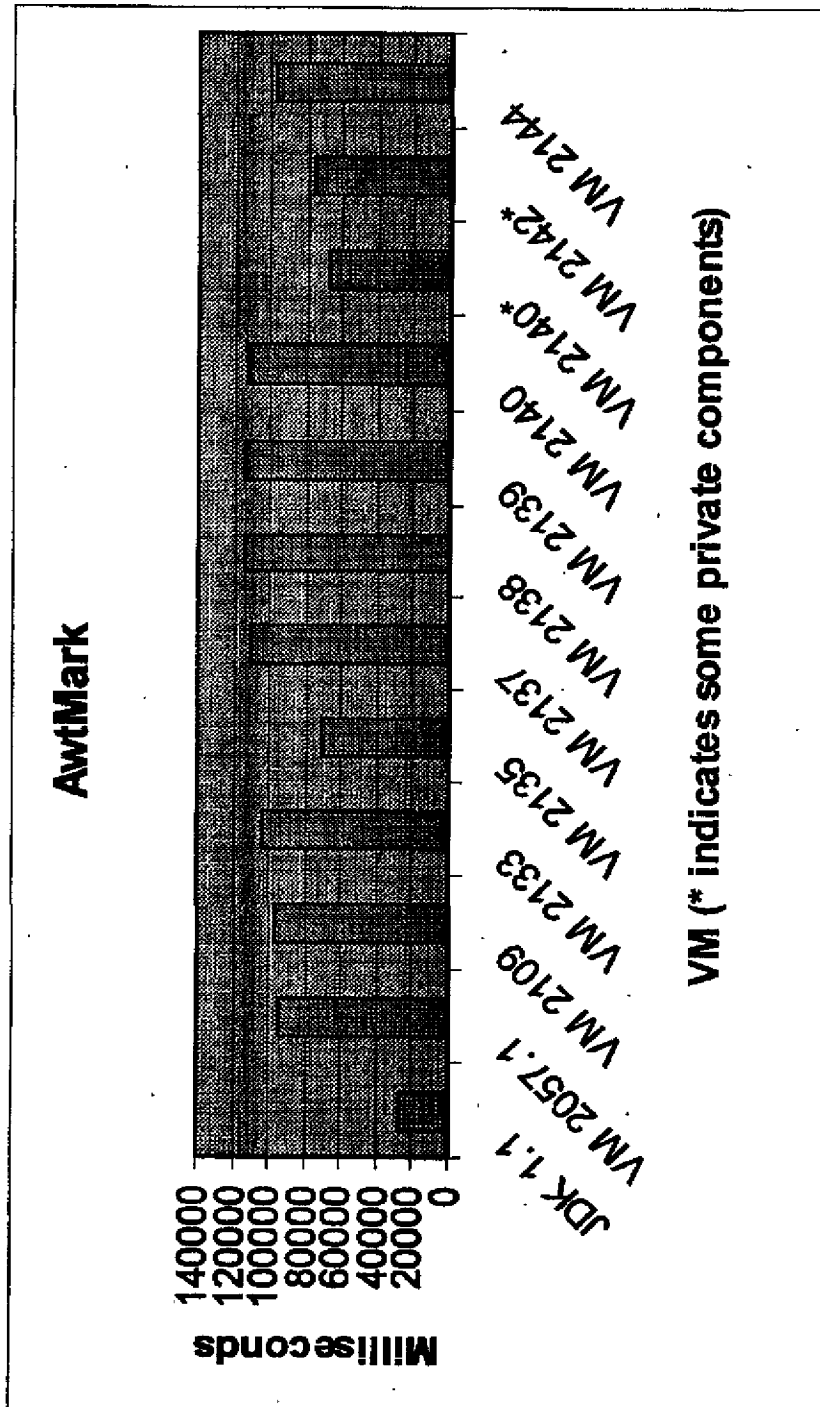
Risks

- AFC
 - Conflicting goals of performance, cross platform, great Win32 support
 - JDK 1.02 support
- Security/package management testing
- Native code compilation
- Opportunity: party on Beans

MSS 0048415
CONFIDENTIAL

ATTORNEYS ONLY

AFC Performance



VM (* indicates some private components)

MSS 0048416
CONFIDENTIAL

ATTORNEYS ONLY

Strategy

MSS 0048417
CONFIDENTIAL

ATTORNEYS ONLY

What is Java?

- Variety of technologies
 - Language, virtual machine
 - Class libraries (APIs)
 - JavaOS
 - Microprocessor, NCs, servers, etc.
- Unprecedented market acceptance
- Key benefits/tradeoffs
 - Broad reach vs. performance/functionality/integration
 - Productivity
- Still immature

MSS 0048418
CONFIDENTIAL

ATTORNEYS ONLY

Microsoft's Commitment to Java

100% Committed to World's Best Java

- Programming language neutral
- Market driven
- Great business model fit
- Many unmet needs
- Making end-to-end investment

MSS 0048419
CONFIDENTIAL

ATTORNEYS ONLY

Microsoft's Java Strategy

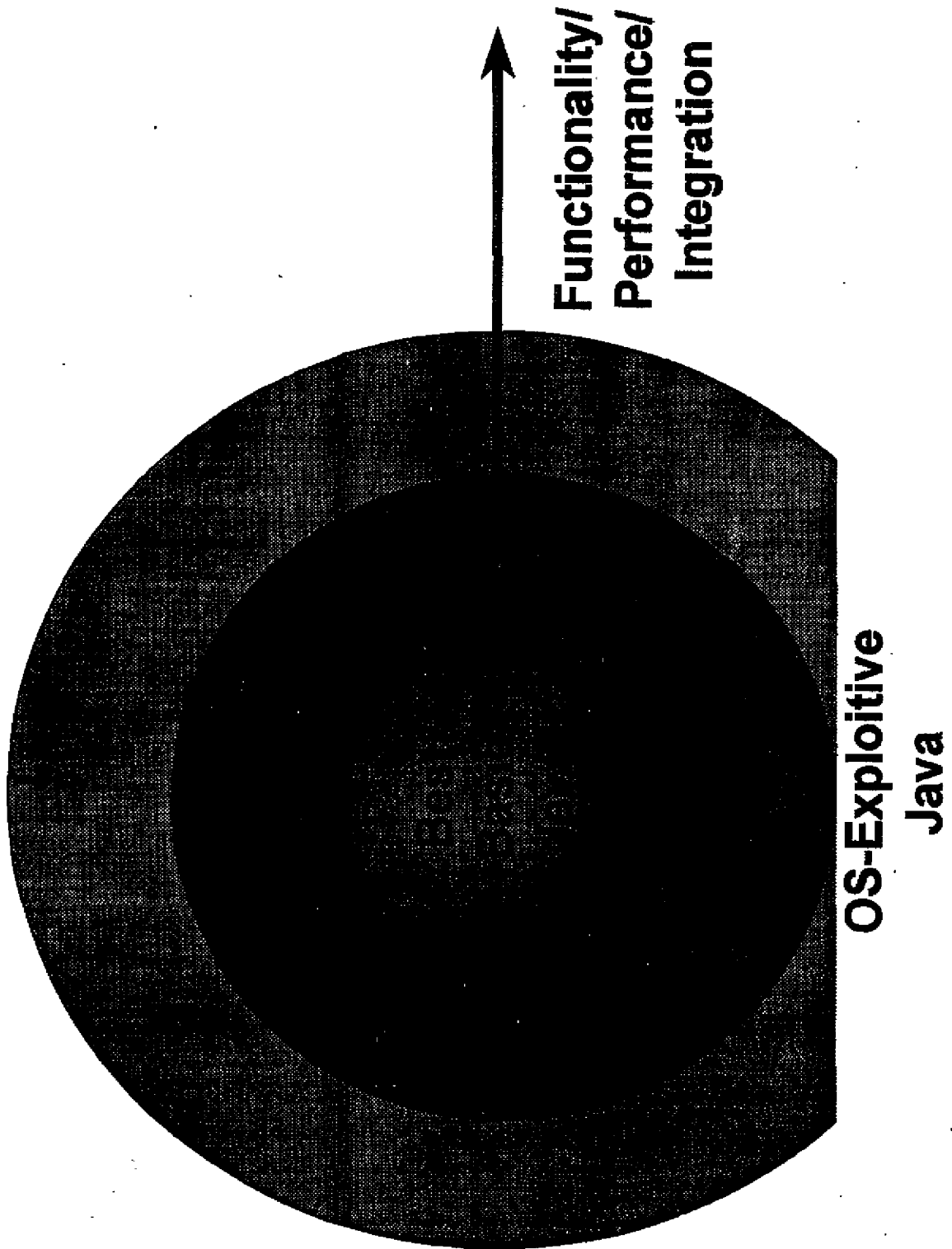
Best Way to Develop and Run Java Applications

- World class technology
 - Best development tool support
 - Best runtime (virtual machine)
 - Best component support
 - Best class libraries
- Make developers successful
 - Choice - write both cross platform and full-fledged Windows applications in Java
 - Fully exploit customer software and hardware investments
 - Provide a business model

MSS 0048420
CONFIDENTIAL

ATTORNEYS ONLY

Range of Developer Choices



MSS 0048421
CONFIDENTIAL

ATTORNEYS ONLY

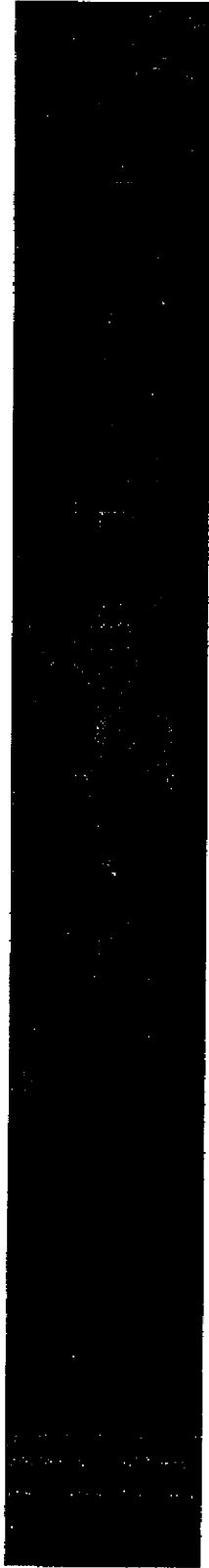


**MSS 0048422
CONFIDENTIAL**

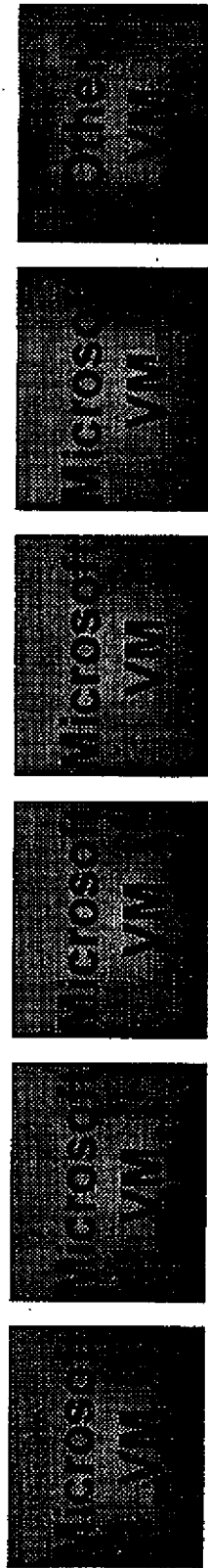
ATTORNEYS ONLY

Microsoft Java Investments

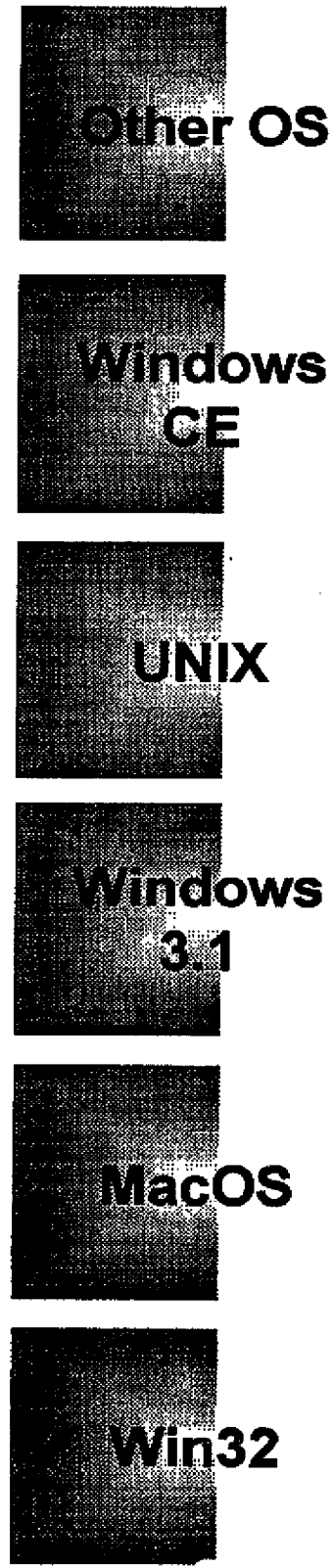
Class Libraries

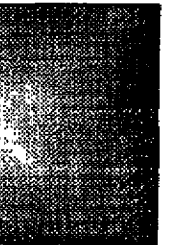
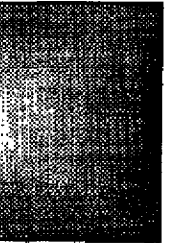
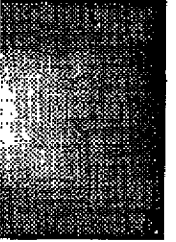
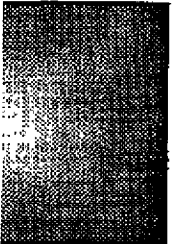
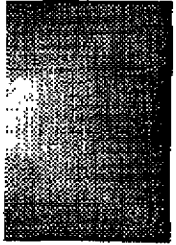
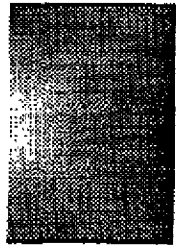


Virtual Machine



Operating System





**MSS 0048424
CONFIDENTIAL**

ATTORNEYS ONLY

IE 3.0 Virtual Machine

- Official Win32® Reference Implementation
- Fastest, safest, most scalable, most reliable, most functional
- Fully compatible
- Critically acclaimed by press and developers
- Microsoft is largest provider of Java today
 - Win 95 OSR2, IIS, IE
- Free ISV redistribution via SDK
- Focused on pragmatic innovation

MSS 0048425
CONFIDENTIAL

ATTORNEYS ONLY

Win32 Virtual Machine Reviews

“Overall, Microsoft's Java environment is more stable and far faster than Netscape's.”

-- PC Magazine Online

“The most striking result is that Internet Explorer 3.0 is the fastest Java environment currently available: Netscape Navigator 3.0 is consistently slower than Internet Explorer, often significantly so.”

-- PC Week

“IE 3.0 is up to 15 percent faster than Navigator for compute-intensive applets. And even on pages where a JIT compiler provides almost no benefits (simple Java applets such as animations and tickers), IE 3.0 still runs Java faster.”

“Internet Explorer runs Java better...”

--CNET

CaffeineMark benchmarks

-- <http://www.webfayre.com>

Competitive Situation - Netscape

- Early leader on Java
- Falling behind
- Abandoning platform ambitions
- Diverging from Sun on security
- Missing Beans support in Nav4
- Tension with Sun but will unite against Microsoft if pushed

MSS 0048427
CONFIDENTIAL

ATTORNEYS ONLY

Competitive Situation - Sun

- Java is not Microsoft's enemy, Sun is
- Capture the API, swap out Windows underneath
- Sun is doing Java equivalent of every Win32 API
- Revenue model challenged
- Repeating UNIX strategy; claim open standard, be the leading implementation
- Battle is for the Win32 implementation of Java

Strategic Challenges

- How to support the language but not the platform
- Kill 100% Pure Java
- Burst the bubble without being the bully
- Enlist allies
- Stop standardization scam
- JavaSoft relationship

MSS 0048429
CONFIDENTIAL

ATTORNEYS ONLY

Strategic Challenges - APIs

- Must separate language/VM/class libraries
- Need API story
 - Hard to call Win32 from Java today
 - Can't compete with Sun in Java-only APIs
 - COM3 APIs are a ways off

MSS 0048430
CONFIDENTIAL

ATTORNEYS ONLY

Backup Slides

MSS 0048431
CONFIDENTIAL

ATTORNEYS ONLY

Test	PS 18MB JFF Summary											
	Sun_JDK 1.1.1	Code 1.51	Super Code	Nav 4.0 PR4	ES.02 w/vm/bk	ES.02 w/vm/bk	ES.02 w/vm/bk	ES.02 w/vm/bk	ES.02 w/vm/bk	ES.02 w/vm/bk	ES.02 w/vm/bk	ES.02 w/vm/bk
Linktest (sec)	1.70	1.03	0.88	N/A	0.93	0.85	0.83	0.83	0.83	0.83	0.83	0.83
Hand (sec)	1.39	0.80	0.82	N/A	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
MemC (loop/line)	5118.00	2847.00	30727.20	N/A	9587.00	8513.60	17318.20	45.00%	8.93%	77.45%	72.54%	70.45%
Shuffle (sec)	9.37	6.06	10.26	N/A	4.16	4.07	4.07	4.07	4.07	4.07	4.07	4.07
Maptest (sec)	2.15	1.41	2.05	N/A	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98
Zipfile (sec)	1.92	1.38	0.82	1.41	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Maptest (sec)	1.25	0.83	0.83	CRASH	N/A	1.49	0.65	0.65	0.65	0.65	0.65	0.65
FileIO (bytes/sec)	CRASH	87.97	151.93	N/A	119.22	142.54	143.00	143.00	143.00	143.00	143.00	143.00
Task-Dir (bytes/sec)	CRASH	51.44	30.61	N/A	34.22	48.24	48.16	48.16	48.16	48.16	48.16	48.16
Sym - Bubble Sort (sec)	14.05	6.17	3.05	N/A	6.83	6.08	6.08	6.08	6.08	6.08	6.08	6.08
Sym - Quick Sort (sec)	11.67	4.80	2.51	N/A	5.73	3.61	3.61	3.61	3.61	3.61	3.61	3.61
Sym - Merge Sort (sec)	3.25	1.61	2.57	N/A	1.80	1.78	1.78	1.78	1.78	1.78	1.78	1.78
Sym - Heap Sort (sec)	2.08	1.12	0.68	N/A	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Sym - Selection Sort (sec)	4.49	2.28	2.85	N/A	2.42	2.02	2.02	2.02	2.02	2.02	2.02	2.02
Sym - Insertion Sort (sec)	2.87	1.95	3.61	N/A	2.38	1.28	1.19	1.19	1.19	1.19	1.19	1.19
Sym - Fibonacci (sec)	2.62	1.97	4.64	N/A	2.43	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Sym - Array (sec)	5.58	2.98	28.21	N/A	3.18	1.16	1.16	1.16	1.16	1.16	1.16	1.16
Sym - Tree (sec)	17.00	8.20	41.03	N/A	17.80	3.76	3.84	3.84	3.84	3.84	3.84	3.84
Sym - Mail (sec)	83.77	51.57	84.24	N/A	43.50	19.75	20.34	20.34	20.34	20.34	20.34	20.34
CM 2.5 - Slave (score)	1462.60	1815.40	1012.40	1038.40	1830.60	1898.60	1878.40	1878.40	1878.40	1878.40	1878.40	1878.40
CM 2.5 - Loop (score)	20545.00	11193.20	366145.40	8699.00	8922.60	8654.40	8801.60	8801.60	8801.60	8801.60	8801.60	8801.60
CM 2.5 - Loop (score)	3583.20	4419.60	4844.80	4915.40	2856.00	7205.60	6862.60	6862.60	6862.60	6862.60	6862.60	6862.60
CM 2.5 - String (score)	811.60	1887.00	4867.40	5472.00	1188.60	2404.20	2071.20	2071.20	2071.20	2071.20	2071.20	2071.20
CM 2.5 - Method (score)	3168.40	4887.40	5872.40	3653.40	3428.60	4363.40	4265.20	4265.20	4265.20	4265.20	4265.20	4265.20
CM 2.5 - Images (score)	1087.60	2029.40	3558.00	3278.60	2843.20	3582.60	3482.60	3482.60	3482.60	3482.60	3482.60	3482.60
CM 2.5 - Graphics (score)	282.20	285.60	271.00	283.40	251.00	265.60	265.60	265.60	265.60	265.60	265.60	265.60
CM 2.5 - Dalg (score)	151.00	143.20	138.20	143.80	135.40	140.80	140.80	140.80	140.80	140.80	140.80	140.80
CM 2.5 - Oval (score)	42.00	82.00	54.20	66.80	68.80	34.20	44.20	44.20	44.20	44.20	44.20	44.20
Flasma (fps)	2898.80	2268.00	28783.40	2131.20	1882.80	2515.80	2728.20	2728.20	2728.20	2728.20	2728.20	2728.20
Shave (score)	39.70	18.10	CRASH	14.44	18.00	18.00	17.86	17.86	17.86	17.86	17.86	17.86
Byzmark - Numsort Sort (score)	8.33	21.40	26.74	22.82	13.74	27.49	30.32	30.32	30.32	30.32	30.32	30.32
Byzmark - Shing Sort (score)	22.40	6.44	6.98	9.32	8.91	6.31	7.42	7.42	7.42	7.42	7.42	7.42
Byzmark - Bitfield Ops (score)	16.01	26.73	9.32	27.79	20.93	21.82	47.82	47.82	47.82	47.82	47.82	47.82
Byzmark - FP Emulate (score)	7.88	13.80	9.13	15.13	8.45	14.38	19.16	19.16	19.16	19.16	19.16	19.16
Byzmark - Fourier (score)	1.30	2.88	3.23	3.78	2.57	2.66	3.74	3.74	3.74	3.74	3.74	3.74
Byzmark - Assignment (score)	6.75	10.88	14.34	12.59	13.19	12.87	15.44	15.44	15.44	15.44	15.44	15.44
Byzmark - DEA Encrypt (score)	3.37	5.24	4.33	5.22	3.21	4.86	5.00	5.00	5.00	5.00	5.00	5.00
Byzmark - Huffman Comp (score)	8.13	13.15	10.12	18.51	15.25	17.24	19.30	19.30	19.30	19.30	19.30	19.30
Byzmark - Neural Net (score)	5.61	11.69	9.01	11.91	11.88	11.53	12.29	12.29	12.29	12.29	12.29	12.29
Byzmark - LU Decim (score)	6.13	12.08	8.63	12.66	7.63	9.82	14.24	14.24	14.24	14.24	14.24	14.24
Byzmark - Integer Index (score)	6.28	12.01	8.91	13.18	10.04	12.82	15.77	15.77	15.77	15.77	15.77	15.77
Byzmark - FP Index (score)	3.53	7.46	6.31	8.32	6.15	6.70	8.85	8.85	8.85	8.85	8.85	8.85
Jmark - AMT Graphics (score)	1762.00	1870.60	1782.40	1885.00	1788.00	1813.80	1850.60	1850.60	1850.60	1850.60	1850.60	1850.60
Jmark - Vectors (score)	842.20	828.00	CRASH	CRASH	840.80	843.80	883.80	883.80	883.80	883.80	883.80	883.80
Jmark - Hash Tables (score)	1477.00	2835.60	1086.20	1443.00	1868.60	4371.20	4147.40	4147.40	4147.40	4147.40	4147.40	4147.40
Jmark - Shells (score)	3708.80	6598.00	3054.00	2210.20	3575.20	10684.00	6304.00	6304.00	6304.00	6304.00	6304.00	6304.00
Jmark - Bubble Sort (score)	1278.20	2549.80	865.60	1980.20	1673.20	4183.60	4270.26	2.03%	2.03%	2.03%	2.03%	2.03%
Jmark - Quick Sort (score)	1455.00	3431.80	1872.80	4013.20	3087.60	5883.20	5887.80	5887.80	5887.80	5887.80	5887.80	5887.80
Jmark - Towers of Hanoi (score)	11924.80	18483.20	3693.40	19528.80	18478.40	31489.60	32375.00	32375.00	32375.00	32375.00	32375.00	32375.00
Jmark - Fast Fourier (score)	680.80	1284.60	723.26	1337.00	1126.40	1448.00	1532.80	1532.80	1532.80	1532.80	1532.80	1532.80
Jmark - AGC (score)	101.40	818.60	110.20	287.40	214.00	67.80	66.40	66.40	66.40	66.40	66.40	66.40
Jmark - Graphics Threads (sec)	13.03	27.15	28.75	10.86	15.64	CRASH	CRASH	CRASH	CRASH	CRASH	CRASH	CRASH

MSS 0048432
CONFIDENTIAL

ATTORNEYS ONLY

