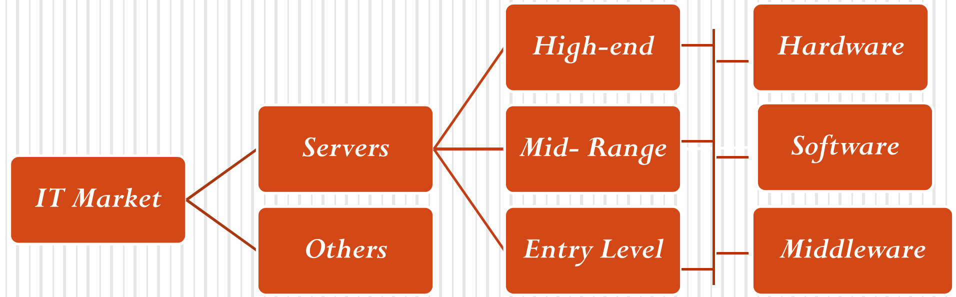
The Issues of Competition in Mainframe and Associated Services in India

March 12, 2010

Research Objectives

- First Study to examine Structure and Conduct of the Server Market in India
- Market segregated into High-end, Mid-range & Low-end (Volume) segments to capture heterogeneity
- Examine the nature of entry & exit barriers and corresponding 'lock in'
- Understand price discrimination in the market including 'Bundling'
- Analysis of relevant regulatory issues and policy implications



Research Approach

Define the Server Market	• Supply Side • Demand Side
Structure & Conduct	• Secondary Data (mainly Gartner) • Primary Survey (conducted by ICRIER & Tekplus)
Legal Implications of Dominance	• Discussions with Legal Experts

Mainframe- an Overview

A mainframe is a high-performance computer used for large-scale and critical computing purposes which need greater availability and security than what a smaller-scale machine can offer.

- Manufacturers of Mainframe– IBM & Fujitsu
- IBM benefited from first mover advantages which resulted in significant structural dominance
- IBM Mainframe had to fight a number of antitrust cases in US & Europe
- Mainframe is not likely to disappear from the market…….
  - IBM's latest offering, Z10, resulted from $1 billion of investment in R & D
  - in last 7 years the market share increased from 17% to 34%
  - in past one year 54 brand new customers added Globally.

Percentage Share of Mainframe in IBM's Total Revenue for India, China and APAC

Year	India	China	APAC
2002	1.48	20.42	22.32
2003	2.32	20.33	20.77
2004	2.30	20.98	21.89
2005	1.66	11.33	15.47
2006	3.52	7.48	13.46
2007	9.33	11.48	17.01
2008	2.54	7.57	14.59
2009	1.10	17.44	20.21

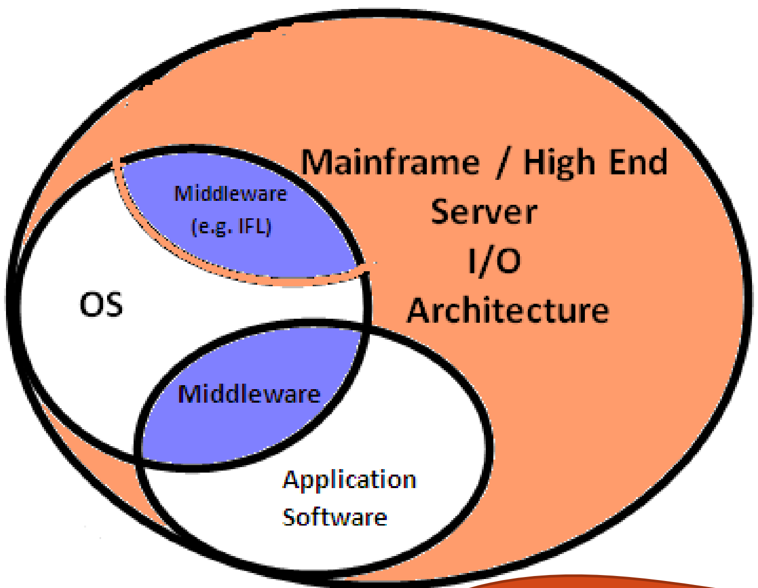
Source: Gartner

Indian mainframe market is young

Classification of the Market

A. Supply Side:

The market segment we investigate can be broadly characterized as ***enterprise-wide client server systems*** deployed in organizations to support operational computing.



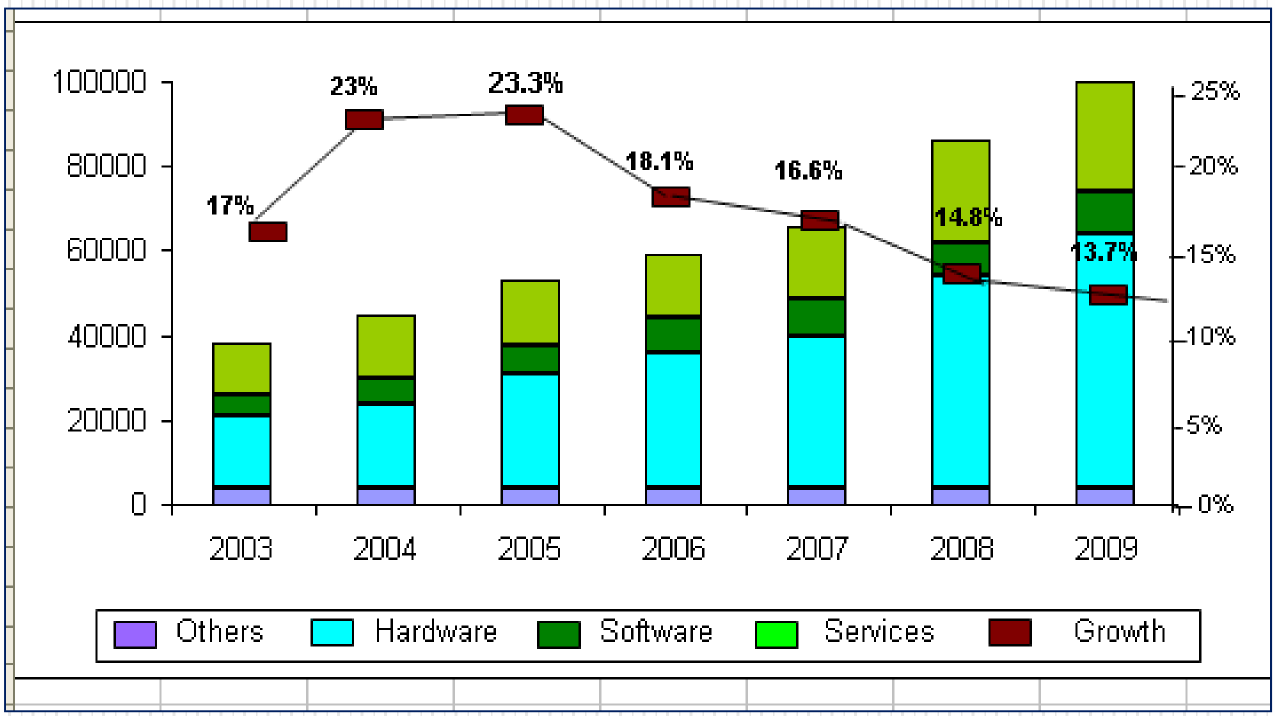
Taxonomy of the market based on selling Price (US $)	
< 25000	Entry level servers also known as volume server market
>25,000-100,000	Midrange enterprise server market
>100,000	High-end enterprise server market, including mainframes

The primary survey shows that significant discounts ranging from 50-90% on the list price are offered for certain systems, including IBM

B. DD SIDE

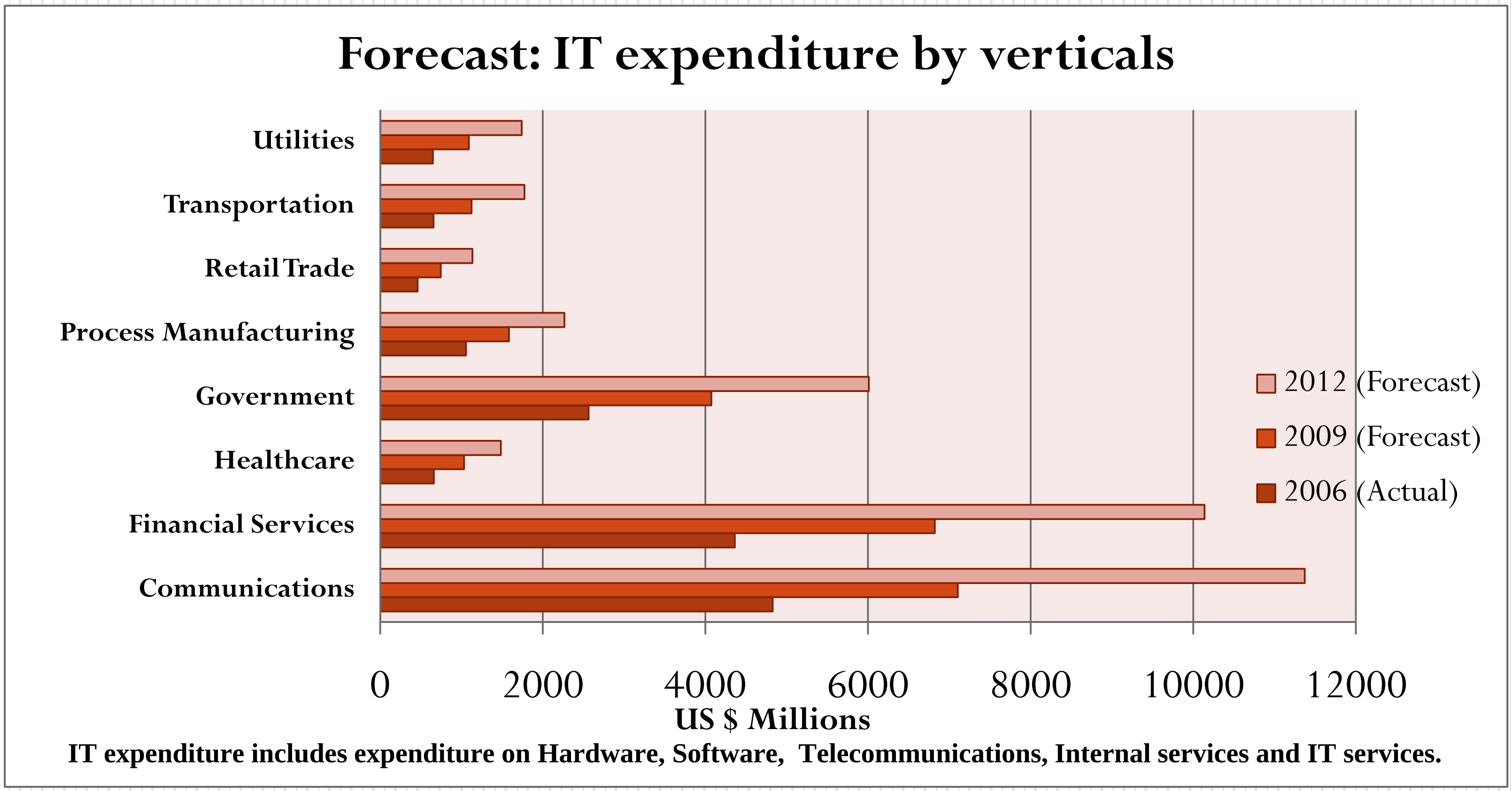
- Data on OS and types of servers used by verticals is not available with Gartner.
- We have however created a distribution of OS by segments.
- Our stratified purposive sample covered specific verticals and high end market segment.

Indian Server Market Growth ……………………………forecast by IDC



Revenue growth in the ***services segment*** alone has reported faster growth than the overall domestic IT market (including hardware, software & services)

Total IT expenditure for India is estimated to reach $ 50 billion in 2012 with a CAGR of 14%. (Gartner Forecast)



List of Players in the Indian Server Market					
Vendors	Hardware	O/S	Middleware	Application Software	Maintenance
IBM	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Hewlett-Packard	Yes	Yes	Yes	No	Yes
Sun Microsystems	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Dell	Yes	No	No	No	Yes
Acer	Yes	No	No	No	Yes
HCL	Yes	No	Yes	No	Yes
Wipro	Yes	No	No	Yes	Yes
Fujitsu	Yes	No	Yes	Yes	Yes
Apple Computer	Yes	Yes	No	Yes	Yes
Lenovo	Yes	No	No	No	Yes
SGI	Yes	Yes	No	No	Yes
Stratus Computer	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Unisys	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Verari Systems	Yes	Yes	Yes	No	Yes
Zenith Computer	Yes	No	No	No	Yes
TCS	No	No	No	Yes	Yes
Satyam Info tech	No	No	No	Yes	Yes
Groupe Bull	Yes	No	No	No	Yes

- *The main three players are IBM, HP and Sun*
- *Entry level market is dominated by x86 machines.*
- *Increasing commoditization of the entry level segment means that vendors in this space compete mainly on cost.*
- *preferred processor for entry level market is X86, 90% of all IBM servers sold in 2009 included X 86 processor*
- *Windows OS has the largest share in entry level whereas UNIX dominates in the mid & high-end segment*
- *in case of HP, larger share of installed OS goes to its own UNIX base OS, whereas in case of IBM share goes to its own AIX OS.*

Indian Server Market

The enterprise level segment has proven to be more resistant to commoditization

Market Concentration Indices ……………

Segment covered: APAC as a region whole & individual countries……..India, China, Australia, Korea

Data: vendor revenue & shipment

Methods: HHI & C4

HHI :

- Highest level of concentration is at high end followed by midrange and entry level market.
- Level of concentration is low using shipment data as compare to vendor revenue

C4:

enterprise level servers ≈100

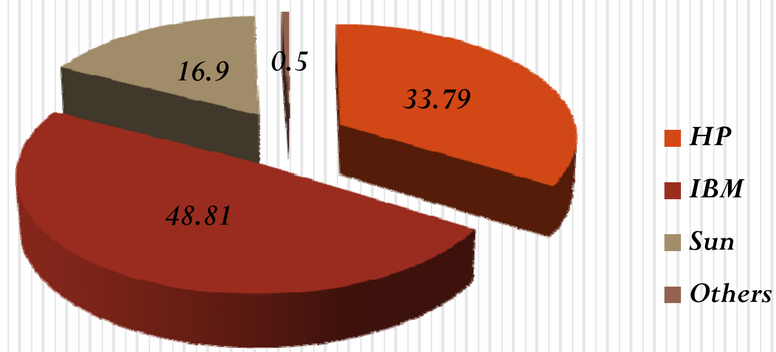
HHI & C4:

- Over time the concentration have not varied much
- the pattern replicated in all countries- APAC, India, China

- **HHI for Mainframe is 1.**

India: High-end segment market

Market Shares in the High-end Segment								
Vendors \ Years	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009 Q1**
IBM	18.25	35.93	28.71	36.47	43.48	48.39	44.90	48.81
Hewlett-Packard	35.47	28.89	29.79	44.47	45.39	36.58	46.91	33.79
Sun Microsystems	44.56	33.91	40.65	17.97	10.40	12.45	7.87	16.90
Fujitsu/Fujitsu Siemens	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00
SGI	1.73	0.54	0.00	0.00	0.00	0.00	0.07	0.50
Stratus Computer	0.00	0.73	0.85	1.08	0.72	2.57	0.00	0.00
Total	100	100	100	100	100	100	100	100

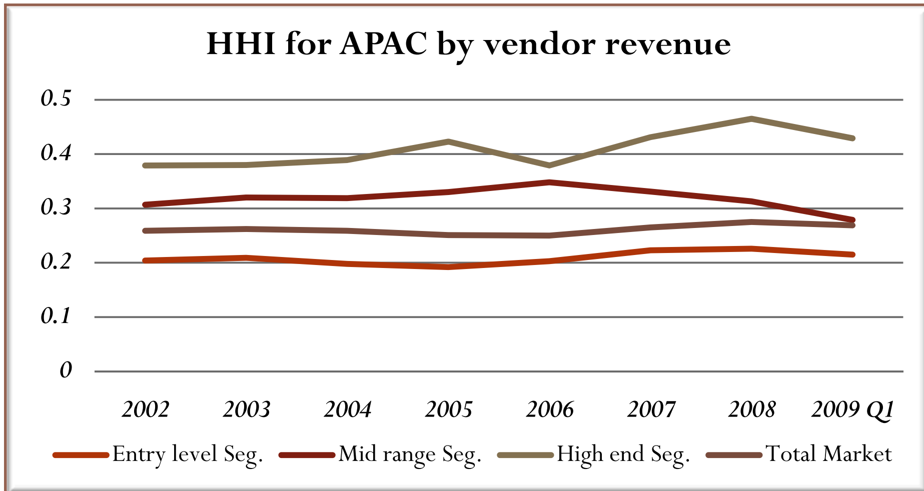


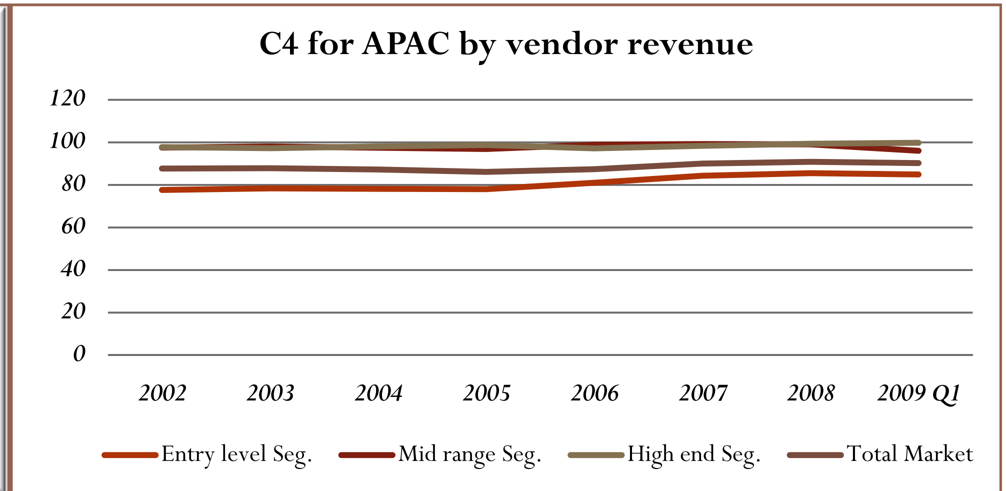
Market share in the High-end segment, 2009 Q1

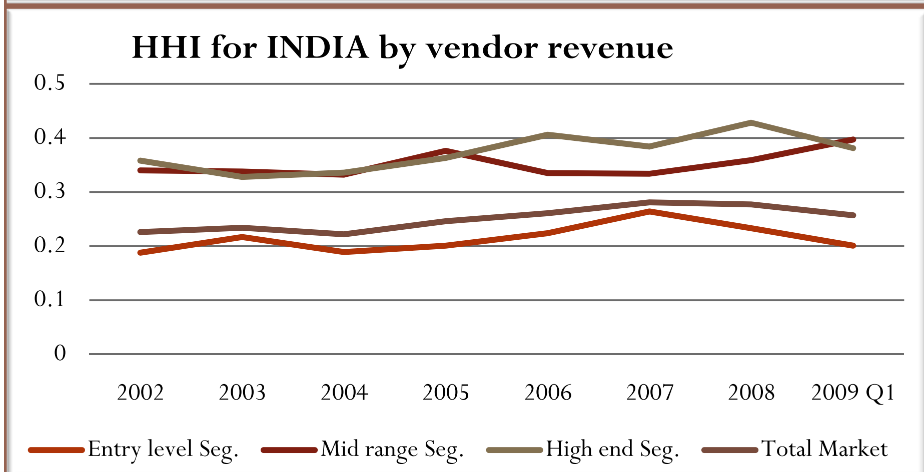
Vendor	2002	2003	2004	2005	2006	2007	2008	2009
Hewlett-Packard	100	100	100	100	100	100	100	100
Linux	0	0	13.0	10.7	0	0	0	20
Others	25.0	42.9	13.0	14.3	19.0	18.2	25.0	10
UNIX	75.0	57.1	60.9	53.6	81.0	81.8	75.0	70.0
Windows	0	0	13.0	21.4	0	0	0	0
IBM	100	100	100	100	100	100	100	100
AIX	28.6	21.1	25	29.4	48.5	50	53.8	50
Linux	0	0	0	0	6.1	0	5.1	0
UNIX	57.1	63.2	50	52.9	30.3	26.7	30.8	33.3
Z OS/OS390	14.3	15.8	25	17.6	15.2	23.3	10.3	16.7
Sun Microsystems	100	100	100	100	100	100	100	100
UNIX	100	100	100	100	100	100	100	100

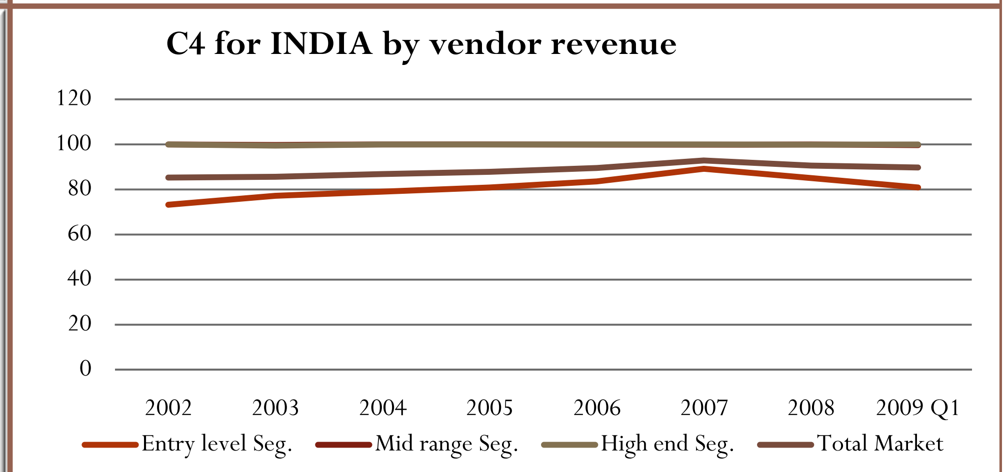
IBMs Proprietary O/S the Z O/S commands less than 5 % market share

Operating system by Vendor in the High-end market by shipment (percentage share)









In India C4 for enterprise level is 100, as this segment is largely served by 'Big Three'

IBM, HP and to a lesser extent

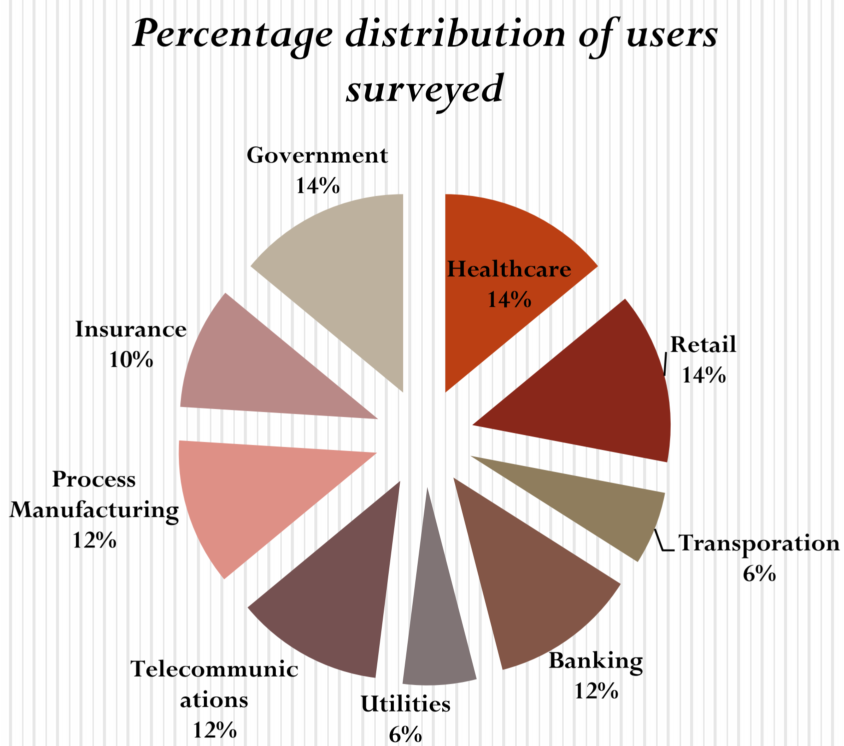
SUN Microsystems

Primary Survey – Sampling

Stratified Sampling, 71 interviews

Target group: *Medium & large enterprises & Vendors*

Conducted by: *ICRIER & TekPlus*



Vertical	Number of users
Healthcare	7
Retail	7
Transportation	3
Banking	6
Utilities	3
Telecommunications	6
Process Manufacturing	6
Insurance	5
Government	7

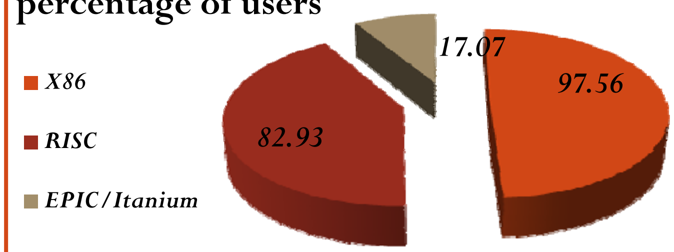
Vendors providing servers to the organization	
Brand	***Number of users***
IBM	29
HP	30
Sun Microsystems	23
Dell	5
HCL	5
Wipro	2
Fujitsu	0
Other	3

Main uses of Server infrastructure	
Types of Workload	**Number of Users**
Web hosting	25
Mail server	39
File & Print Server	36
Security Applications	19
IT & Network Management	24
Cross-industry Applications (ERP, CRM etc.)	33
Core Applications (Banking, telecom etc.)	35
Messaging & Collaboration	30
Others	1

Operating Systems running on the servers	
Types of OS	**Number of users**
Open Source Only	0
Proprietary Only	15
Open Source and Proprietary	26

	Percentage	**Number of users**
Percentage of server infrastructure used to run mission-critical data	1 – 25	0
	26 – 50	10
	51 – 75	21
	76 – 100	10

Server architecture by percentage of users



Descriptive Statistics

Primary Results contd………

Extent of Competition in the three segments						
Market segment	Number of vendors (scale of 1-10. 1-high, 10 -low0					
	1	2	3	4	5	6
High End	2	0	2	0	2	1
Mid Range	3	0	5	0	0	0
Entry level	7	0	1	0	0	0

Intensity of competition in the submarkets						
Market segment	Number of vendors (scale of 1-10. 1-high, 10 -low0					
	1	2	3	4	5	6
Hardware	7	0	0	0	0	0
Software	1	0	2	1	3	0
Maintenance (including services)	3	0	3	0	1	0

Vendors faced different levels of competition in the segments depending on the performance and requirement of the buyers

- *extent of competition in the high-end is the least & highest in the volume segment*
- *the extent of competition in software is perceived to be the lowest compared to maintenance and hardware services.*

Oracle at present tends to create a greater 'lock in' than does IBM…….users view

Extent of Competition

Primary Results contd………

Primary Survey- Findings

IBM's recent deal with Bharti Airtel has broken the SUN's dominance in ***telecommunication*** vertical

- In India, activities of server vendors are not region or vertical specific
- Most of the servers sold are imported, Indian production is limited to low end
- All the vendors provide system software and management software with their hardware.
- All vendors try to create a 'lock in', main reason for lock in is technology

Our survey reveals that factors considered important in product refresh cycle by vendors are ***technology demand****,* ***price competitiveness*** *and* ***market vision.***

	2007	2008
SUN		
Net Revenues ($ million)	13873	13880
R&D expenditure ($ million)	2008	1834
R&D expenditure as a % of revenue	14.47	13.21
Advertising expenditure ($ million)	25	32
Advertising expenditure as a % of revenue	0.18	0.23
IBM		
Revenues ($ million)	98786	103630
R&D expenditure ($ million)	6153	6337
R&D expenditure as a % of revenue	6.23	6.12
Advertising expenditure ($ million)	1242	1259
Advertising expenditure as a % of revenue	1.26	1.21
CISCO		
Net sales ($ million)	34922	39540
R&D expenditure ($ million)	4598	5325
R&D expenditure as a % of Net sales	13.17	13.47
Sales and marketing expenditure ($ million)	7401	8690
Sales and marketing expenditure as a % of Net sales	21.19	21.98

Cisco, the world's biggest network equipment maker has recently entered the server

R& D and Advertisement Expenses details

Comparison between Sources of Market Power for Microsoft and IBM

- Windows is dominating the desktop market with around 93% market share. Linux and Mac Os x are having 1% and5 % market share respectively.
- In the mainframe market IBM allows the sale of its mainframe software z/OS with its mainframe hardware only thereby making IBM a virtual monopoly in the mainframe segment.

	Microsoft	**IBM**
Operating System	Windows	Z-OS
Hardware	PC Desktop System	Mainframes, System Z10
Market Share	90%	< 5%
Network Effects	Very Strong	Weak
Switching Cost	High	Enormous
Nature of Barrier	Application barrier to entry, where application writers would choose to write for windows because of 90% market share	Once on mainframe cannot port easily, huge barrier to exit for clients
Remedy	Unbundling Operating System from browser, ban on exclusive dealing	Provide Interface Information (API), ban on exclusive dealing and license Z O/S to other hardware & software vendors

Country	Brand	OS	Average price (US $)
2007			
India	HP 9000 Superdome	HP-UX	1,963,721
India	Superdome	HP-UX	868,467
India	System z9 BC	zOS/OS390	1,040,691
China			2,047,661
India	System z9 EC	zOS/OS390	1,382,140
China			2,816,574
2008			
India	HP 9000 Superdome	HP-UX	1,498,466
India	Superdome	HP-UX	732,976
India	System z9 BC	zOS/OS390	484,747
China			885,330
India	System z9 EC	zOS/OS390	1,194,313
China			1,557,941
2009			
India	HP 9000 Superdome	HP-UX	1,044,253
India	Superdome	HP-UX	449,918
India	Superdome	Linux	288,766
India	System z9 EC	zOS/OS390	450,128
China			4,985,029

Mainframe and Superdome's average price in India and China

- The average price of the mainframe with z O/S is one and a half to ten times more expensive in China.
- The price of the mainframe is comparable to the price of an HP Superdome 9000 series in India.

Competition for the market ....the threat of technology

- A technological development called 'cloud computing' could do to the enterprise segment market what commoditization has done to the entry level i.e. create pressure for cost reductions as enterprises shift to services 'in the cloud'.
- Cloud will take few more years to mature and grow to be robust, is therefore unlikely to displace the dominance of the big three in the enterprise level segment for the next three or realistically, in the next five years in India.

Cloud computing though attractive & new technological development,
Maturity of cloud architecture will take next 3-5 years........
Massimo Pezzini Gartner Analyst

- Risk of Privacy, Security and Regulation are obstacles in way of CC. Another issue of concern is lock-in due to non-compatability of a cloud with other one.

Benefits of Open Systems

Massive IT demand from UID:

- Key holds of UID Project are Biometrics and computing power
- Technical specifications are not declared publically
- All vendors trying to get into it

- All the large public sector units and government departments we interviewed placed a high degree of reliance on their own IT departments.
- GoI's recent recommendations on FOSS & Econ study by IIM(B) support open systems. Chhattisgarh, Kerala & Delhi have a separate ICT policy recommending use of OSS
- Field survey………TCO of OSS is no different from Proprietary UNIX based software. Some firms opined that when number of instructions crosses a certain limit……..OSS fails

Is there Abuse of Dominance in the high end

Factors of assessment of AoD

- If the enterprise operates independently of competitive forces prevailing in the relevant market;
- Conduct goes beyond normal commercial interests

IBM's mainframe

- IBM held 50% of the market share in the high-end segment in 2009 Q1
- Mainframe sold as a bundled product
- Clients on mainframe platform face very high switching cost

Globally 97.5% of sales in 2008 were due to upgradation, IBM mainframe has benefitted more from lack of competition than from updated technology

Main Findings of the Study

- Indian IT market is growing, a late start in the computer age with well informed and knowledgeable clients who follows multi vendor and multi platform approach
- Critical reasons cited is High mainframe price but none of the mainframe or high end IBM buyers however felt over charged by IBM although its expensive….field survey experience
- Huge entry barriers in the high end server market world wide, including India
- Mainframe workloads can be moved to other high-end servers like Unix servers made by Hewlett-Packard and Sun, and IBM itself
- Expected domestic demand for IT will come for government in next few years
- Mainframe with Linux is being increasingly used in India in past 5-6 yrs thereby reducing the chances of lock in.
- Large enterprises prefer to buy hardware bundled with the operating system to get comparative advantage in providing not only the software but also maintenance and support services to the client.
- Skilled in house IT team can help in opposing monopoly power of any vendor, GoI org. are following the same rule

Policy Recommendations

Indian mainframe market is at its nascent stage. HHI is 1, implying IBM become dominant. Source of Market Power to IBM (mainframe) is barrier to exit i.e. lock in and a non-visible price discrimination strategy .

For orderly growth of the server market key actions include :

- Measures to promote openness
  - Unbundling of software from the underlying hardware
  - Interoperability between different server systems
- Government procurement could alter dynamics of market competition
- Advocacy role of CCI

Thank you……..