

Linux Technology in New System Architectures

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Shift to MMU-full 32 bit microprocessors as the “host controller” in system designs.

Increasing memory density and increasing peripheral capability reducing “super-fast” real-time demands on the host processor and host OS.

Trend toward “intelligent connected everything”. All product categories are enhanced by (1) embedded intelligence and (2) internet connectivity.

The technology recession and hyper-competition driving the need for cost savings: “do it yourself” OS’s (traditionally a giant segment of the market) are history.

The spread of Unix as a standard common computing and development platform.

The disruptive values of open source!!

Linux/GNU software is ***DISRUPTIVE TECHNOLOGY*** for embedded systems.

New/unique values brought to bear as a result of open source nature combined with embedded market requirements:

- ◆ Ease of customization of all level of system software.
- ◆ Availability of development talent worldwide.
- ◆ Availability of enabling software for leading h/w technology.
- ◆ Vendor independence.

Traditional vectors of competition over-satisfied by traditional solutions:

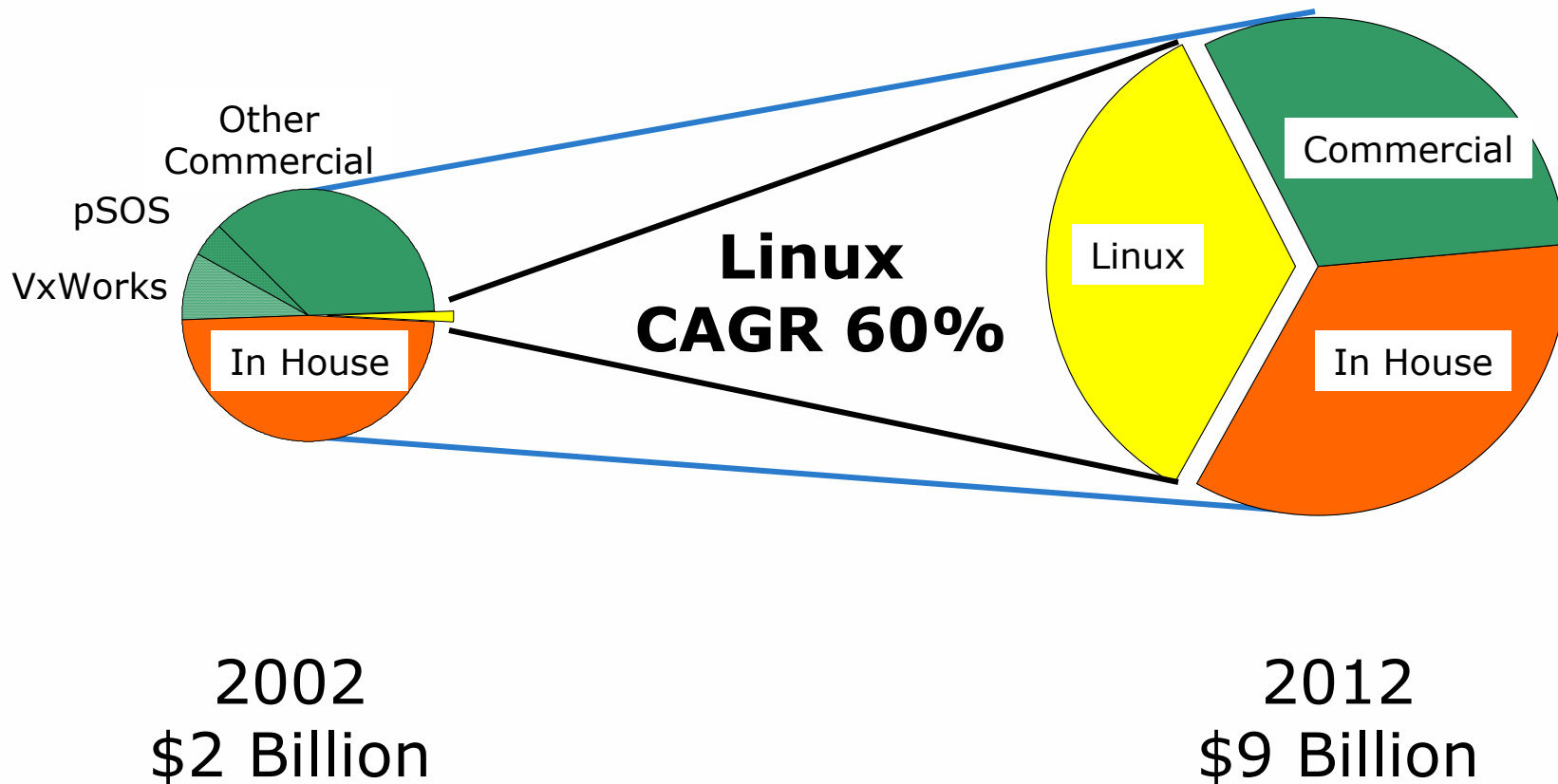
- ◆ Real-time response
- ◆ Footprint

New product categories and underlying technology evolution reduces the need for extreme capabilities in these two areas.

We have shifted into the early majority phase of the embedded Linux market:

- ◆ 1999-2001: early adaptors
 - ❖ Open acknowledgement of lacks, “I want to use it anyway”
- ◆ 2001-2002: “the chasm”
 - ❖ “Tell me about who else in my industry is using this?”
Answer: you are the first!
- ◆ 2003-??: early majority
 - ❖ “My competitors have Linux based offerings and my customers are asking me where’s mine...”

The Hot Growth in Embedded is in Linux



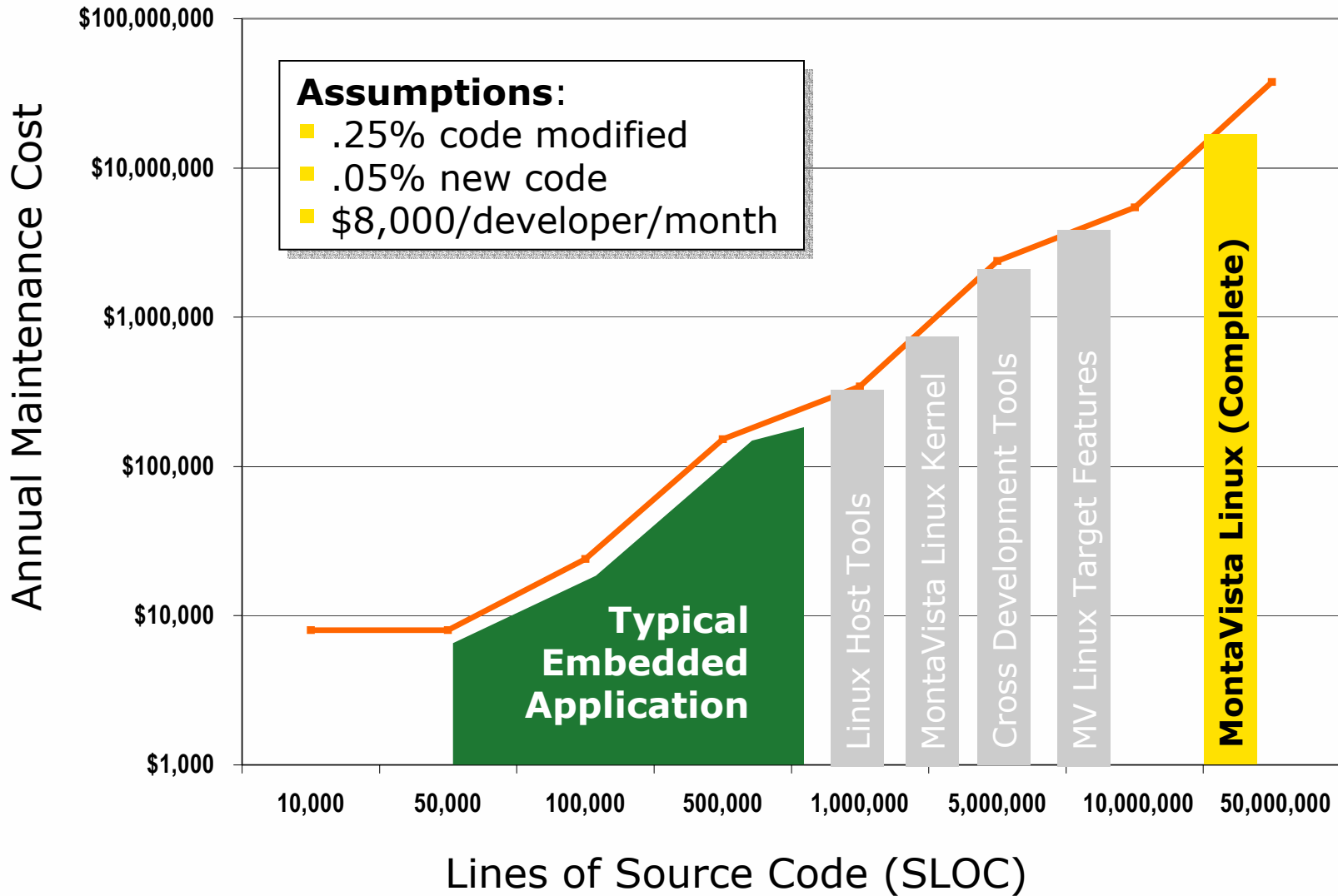
Source: Company & VDC data

The Role of Commercial Linux Vendors for Product Developers

Do-it-yourself approaches to crafting open source based embedded solution software is viable BUT...

- ◆ Cost is always a function of content/size.
- ◆ Vacuuming the web is just the START of your software cost equation, not the end!!
- ◆ The more you vacuum, the larger your steaming pile of technology becomes, with all that that implies.
- ◆ Value addition to meet specific requirements...integration...testing...packaging...support...all the traditional “proprietary” issues and values are still extremely important to users! And no less expensive to deal with...
- ◆ ...particularly when you reach the point of vacuuming literally 10's of millions of LOC!!
- ◆ The role and the value provision of vendor solutions quickly becomes apparent to those who understand software economics.

Investment to Create and Maintain Linux-based Embedded Platform



Linux is the single most significant threat to Microsoft today, and arguably ever.

Anti-Microsoft sentiment is high world-wide, and Linux is the alternative.

The war has three fronts: servers, embedded, and desktops.

Microsoft investment in embedded system software is at new highs; they will not cede this market to Linux casually!

Proprietary system software is doomed

- ◆ The economic advantages of open source (to all players in the business ecology) are overwhelming.
- ◆ The battle reduces to open source vs. Microsoft. No other vendor can support the sustain investment levels required to compete.
- ◆ Eventually, Microsoft will lose, because of the unique values of open source.

