It's a Green, Green, Green, Green World

Bill Gervasi

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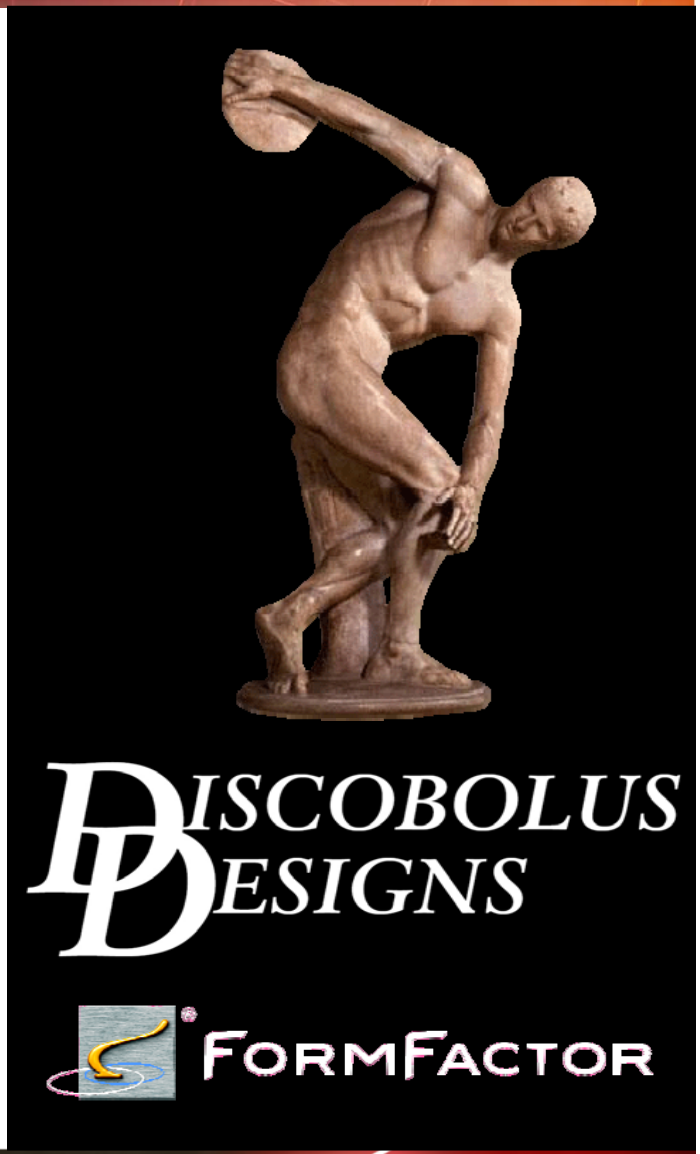
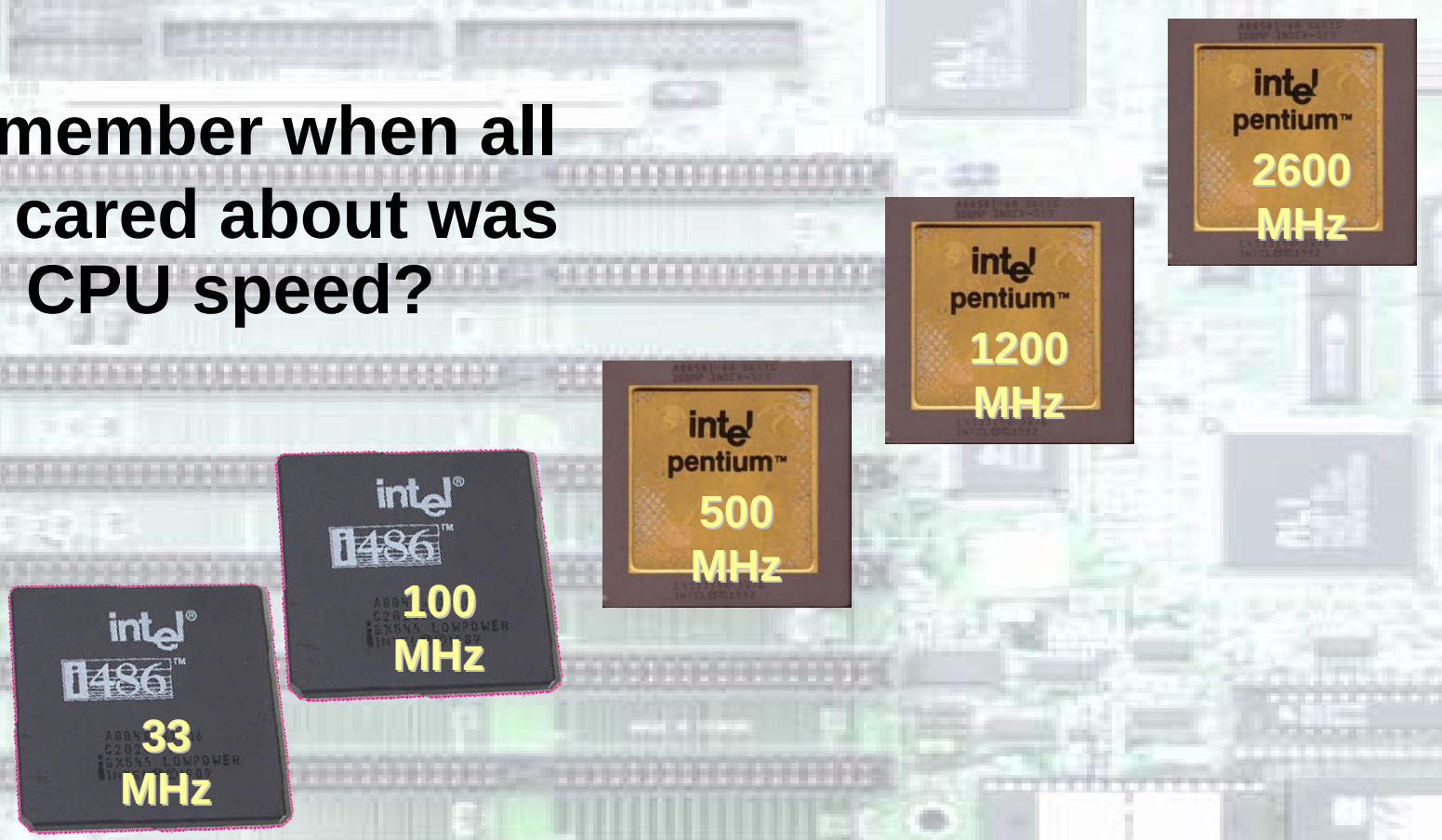


MHz Is Sooooo 1990s

Remember when all we cared about was CPU speed?



Now Who Knows What Chip?

...and who cares???

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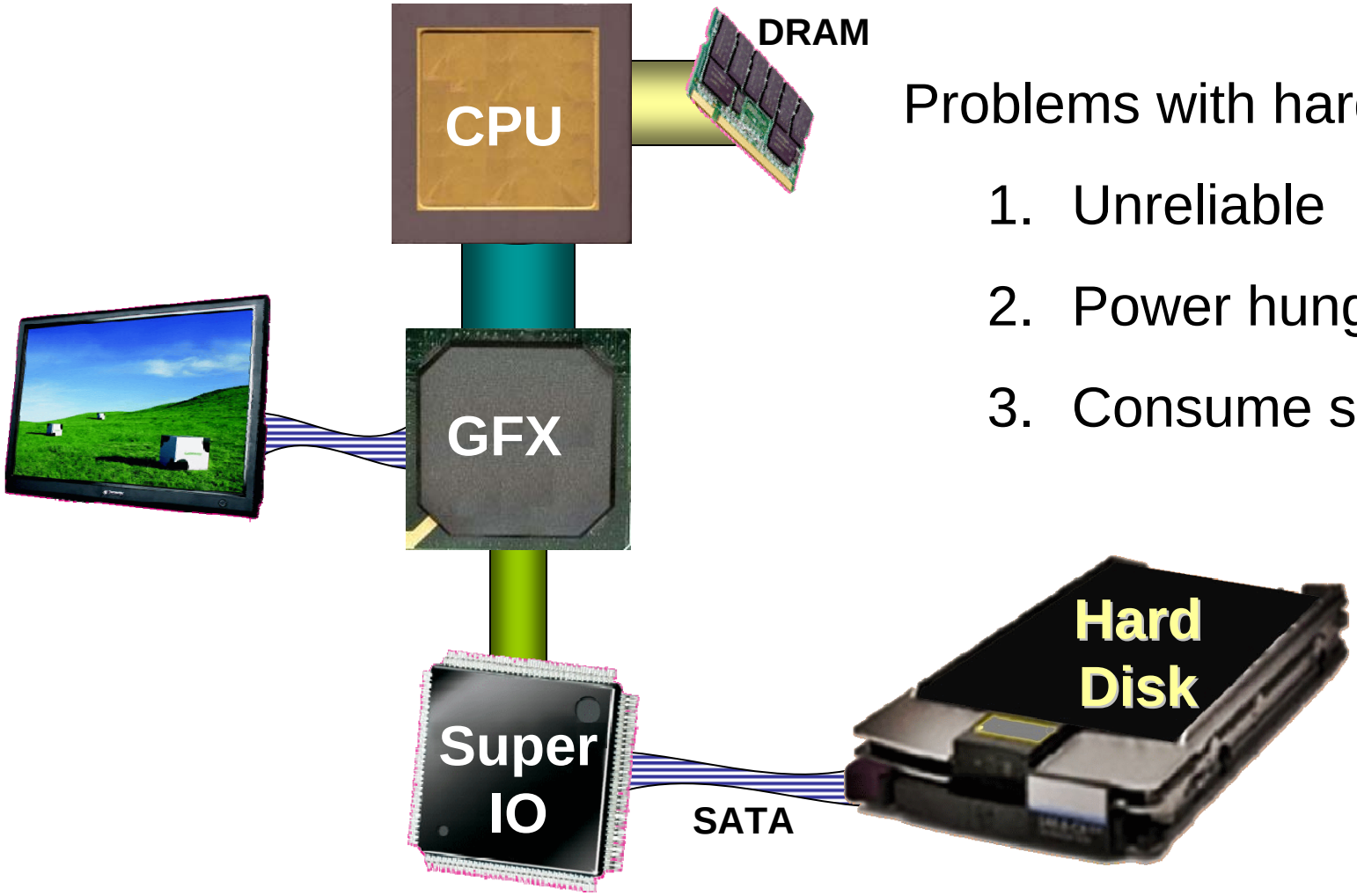
Dirty Little Secrets

Computer architecture has stabilized

Most everything can be accomplished with a 500 MHz CPU

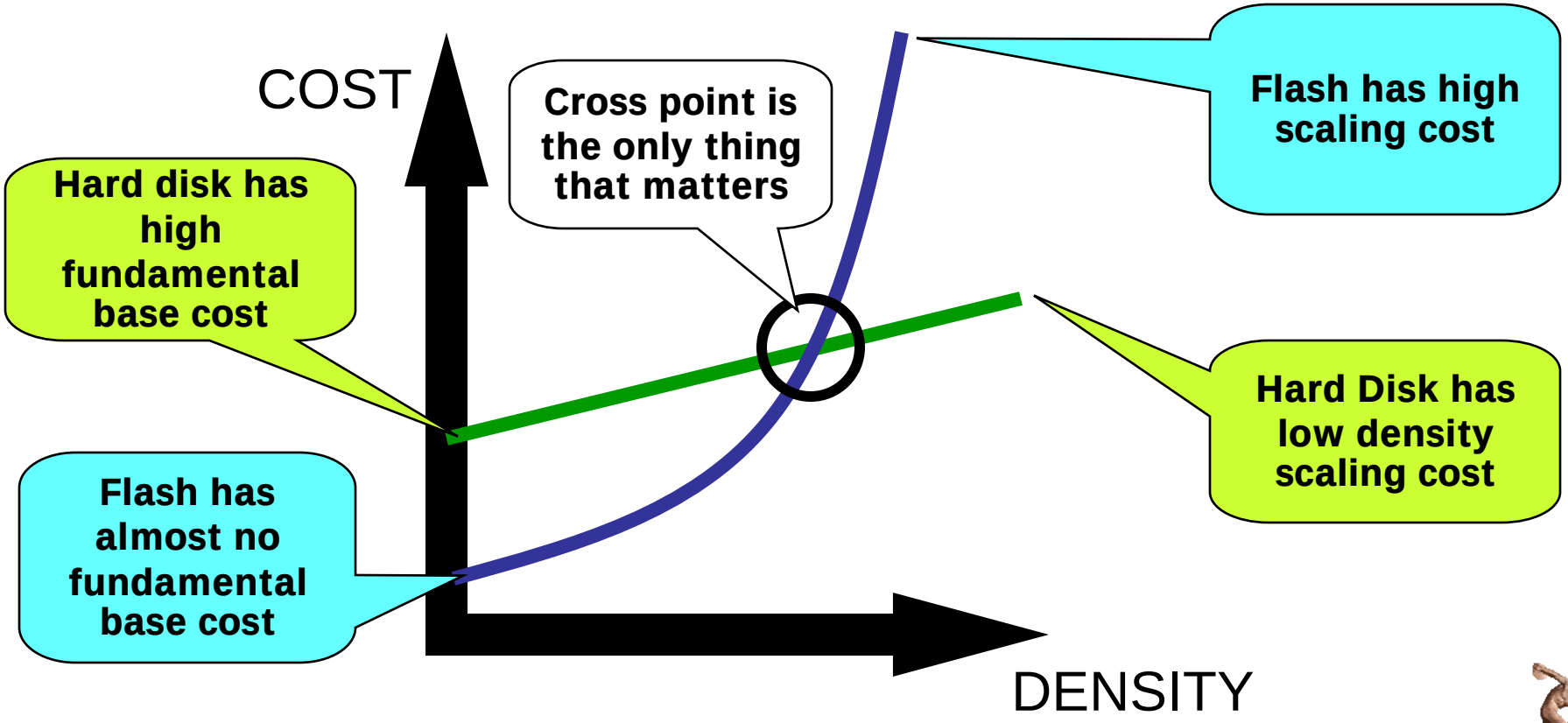
Power and **size** are the new differentiators



Problems with hard disks:

1. Unreliable
2. Power hungry & hot
3. Consume space

Flash Versus Hard Disk Crossover



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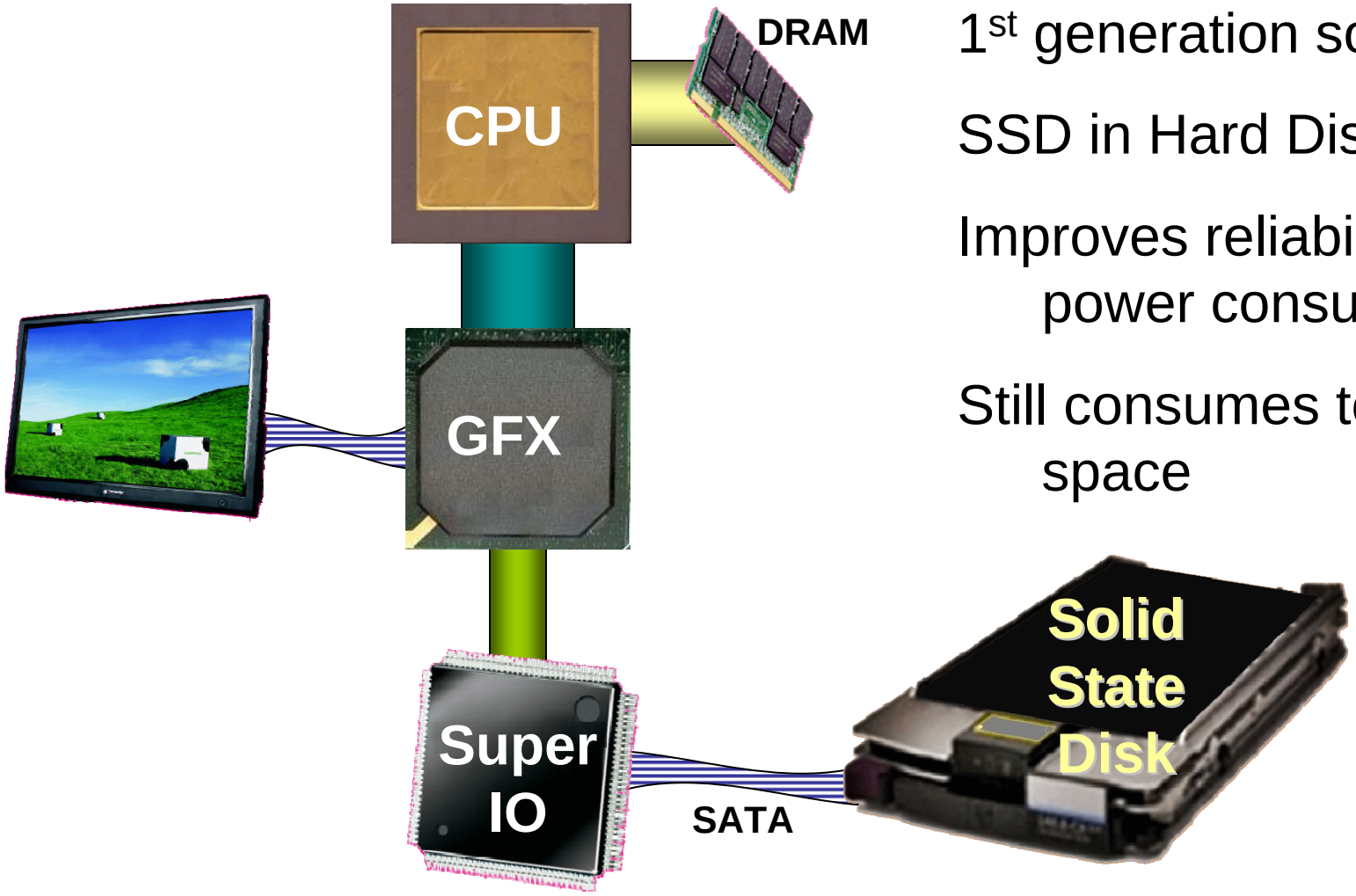
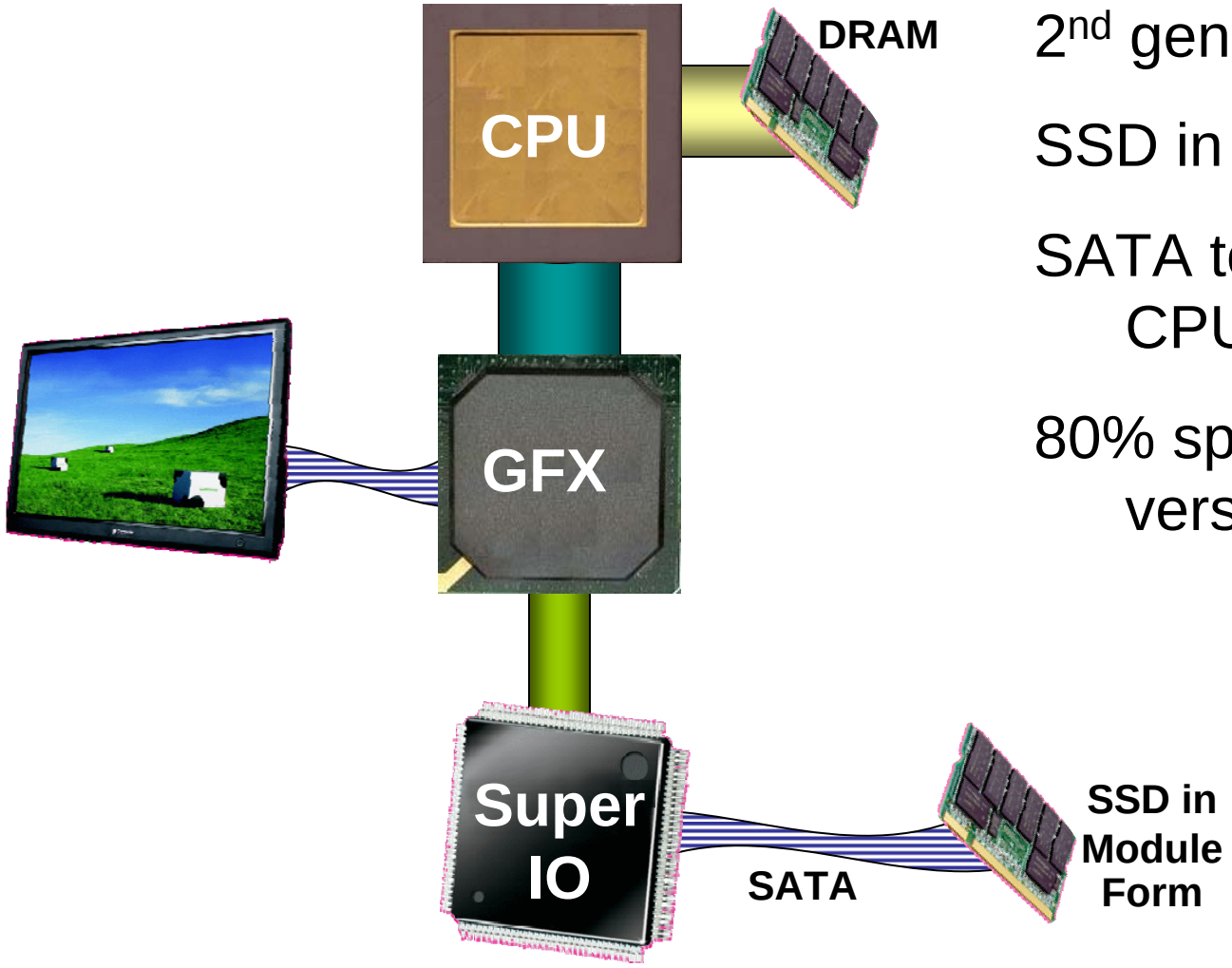


1st generation solution:

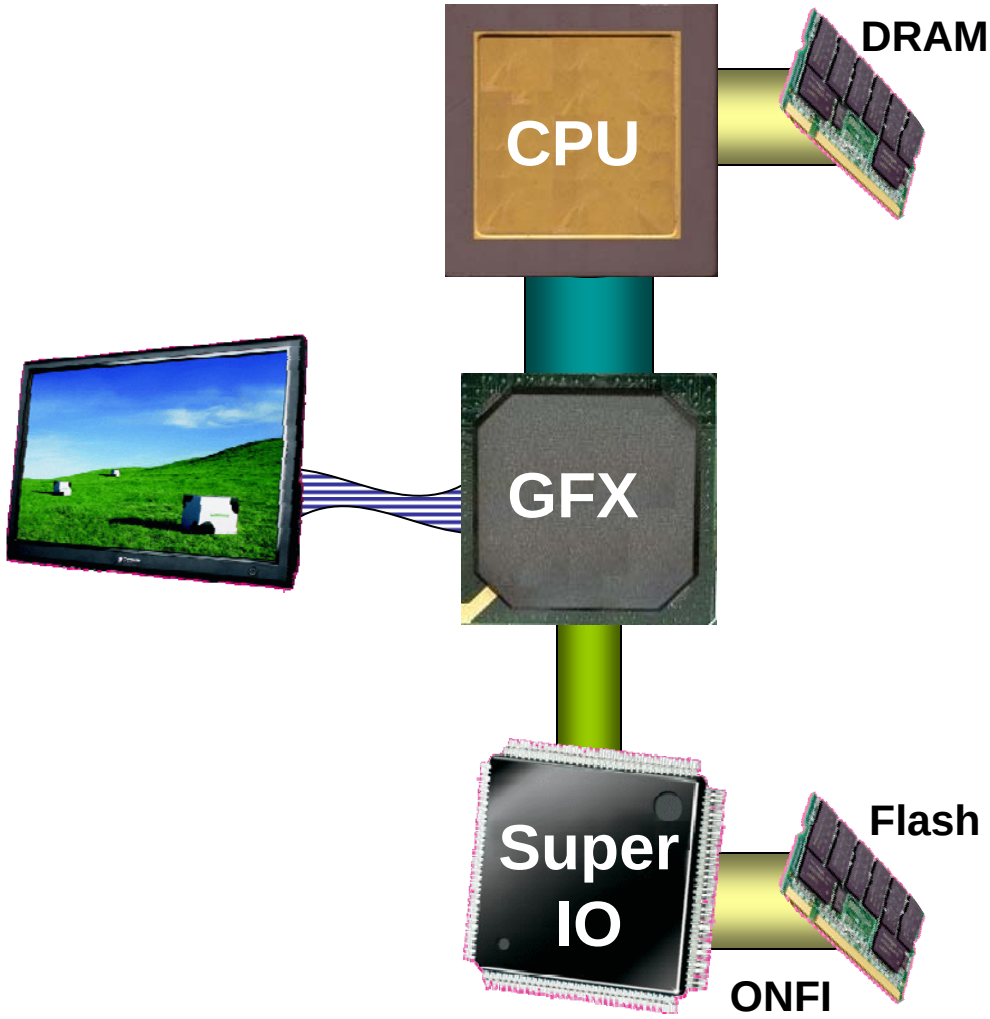
SSD in Hard Disk form

Improves reliability, power consumption

Still consumes too much space



- 2nd generation solution:
- SSD in module form
- SATA to Flash intelligent CPU on module
- 80% space savings versus hard disk



- 3rd generation solution:
- Flash module, no CPU
- Flash management algorithms done in x86 software
- 80% space savings versus hard disk

Contrasting SSD & Flash Module

SSD	Flash Module
• Low power CPU runs flash control algorithms	• High power CPU runs flash control algorithms
• Higher idle power	• Lower idle power
• Higher performance	• Lower performance
• $Cost	• $Free

How Can Hard Disks Go Away???

USB

Ethernet

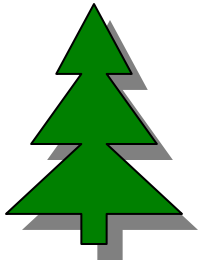
Firewire

Wireless

Cloud

External TeraBytes

100+ GigaBytes Flash Inside



Going Green?

Flash control algorithms are still quite challenging

Reducing power and heat

- SSD performs flash data management locally over low power bus with low power CPU
- Flash module requires high power CPU over multiple high power buses to manage data

Hard disk moves outside the PC

SSD in hard disk form factor lasts a short time

SSD in module form replaces hard disk form

Flash module eventually replaces SSD if software challenges can be met

Summary

Internal hard disks will be replaced by Flash technology

It is not a question of if, it is a question of how quickly

Demand surge when cost of 100 GB of Flash near 100 GB of hard disk

Questions?

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