

INTEL NUC NANOLAB

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It's All
About the
WAF!

WAF

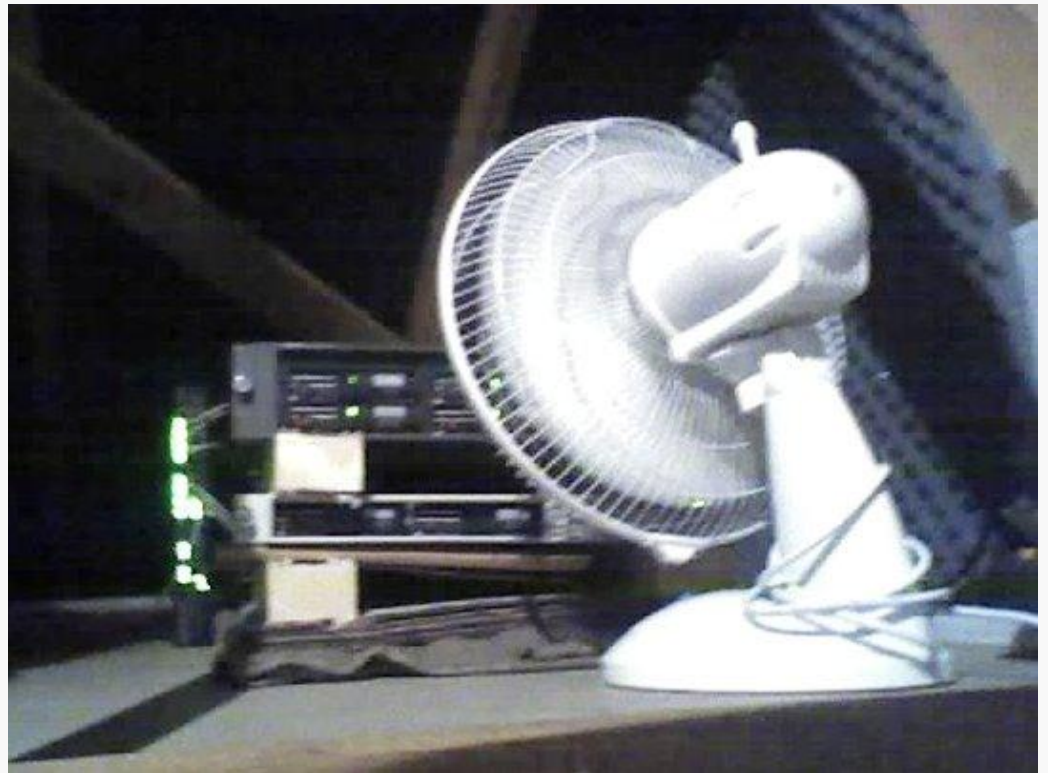
Wife Acceptance Factor

“design elements that increase the likelihood a wife will approve the purchase of expensive consumer electronics products”

Wikipedia

2005 – OLD ENTERPRISE KIT

- Bare metal ESX
- Pros:
 - Lots of RAM/host
 - Like a real environment
 - Remote Access (iLO/DRAC)
- Cons:
 - Noise!
 - Expense
 - Power & Cooling!
 - Not reusable
- WAF
 - 1/5



2009 - VINCEPTION

- VMware Workstation nested VMs
- Pros:
 - Reasonably compact
 - Reasonably quiet
 - Flexible
 - Can add lots of RAM
 - Performance with SSD
 - No HW compatibility issues
- Cons:
 - Patching Windows!
 - Poor resilience
- Tips
 - VMware Tools Fling (@lamw)
 - Autolab
 - Tiny Linux Distros – DSL/TTY/SLITAZ
- WAF
 - 3/5



2011 – HP MICROSERVER

- Bare metal ESXi
- Pros:
 - Compact-ish
 - Quiet-ish
 - Cheap!
 - Flexible
 - Remote Access (iLO) option
- Cons:
 - Could be smaller!
 - Could be quieter!
- WAF
 - 4/5



REQUIREMENTS

- Location, location, location!
- Silent or as quiet as possible
- Small form factor
- Low power
- 16GB+ RAM per node
- 'Reasonable' CPU, at least 5–10 VMs per host
- Minimal cost (< £300 each)
- Optional: Remote access (IPMI / iLO / vPro)

- Key requirement: MAXIMUM WAF!

INTEL NUC – WHAT IS IT?

- SFF Barebones PC
 - 4"x4" Motherboard
 - Sandy Bridge / Ivy Bridge/ Haswell
 - 1x Intel 1gbps NIC (82579V)
 - 2x Mini PCI Express Slots
 - Virtually silent
 - External PSU
-
- Just add:
 - RAM
 - USB stick
 - mSATA SSD [Optional]
 - 2.5" SATA Drive [Optional]



THE GOOD, THE BAD AND THE UGLY



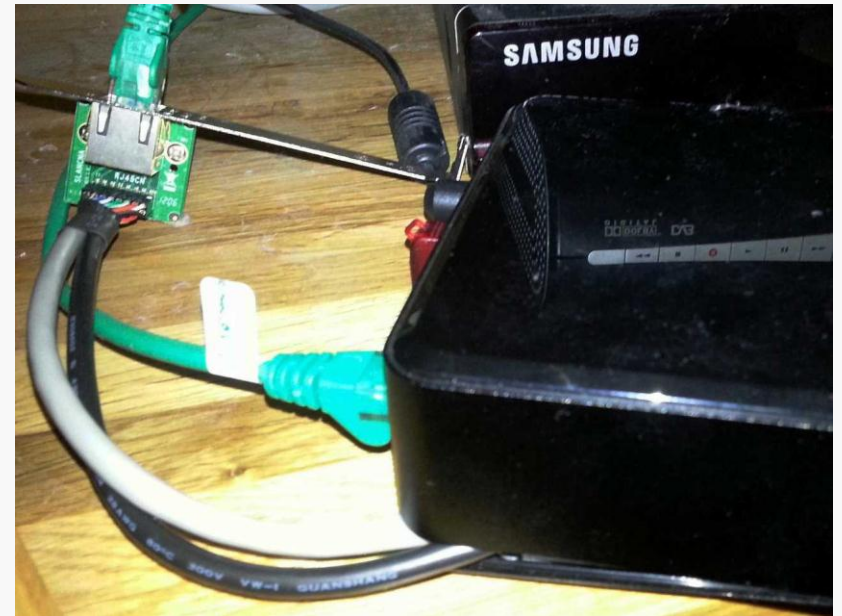
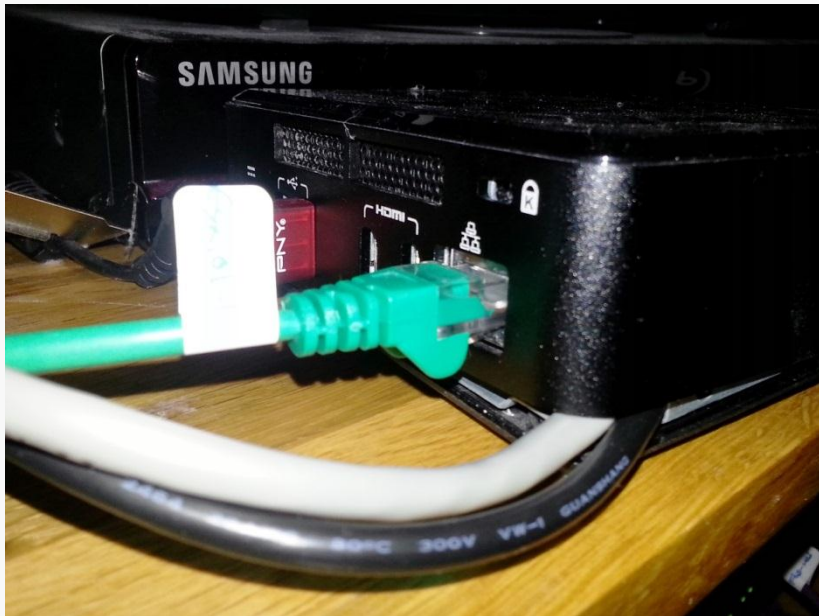
- Box plays Intel music when opening!
- Silent
- Tiny
- Multiple CPU options
- Remote access (vPro)
- Latest support 2.5" drives (VSAN?)
- Lots of development (3 gens in 12 months & Broadwell en route)
- 3-year Warranty



- Originally no power cable
 - WHY!?!?!?
- Minimal flexibility
- 2x 8GB SODIMM Limit
- On-board NIC not natively supported in ESXi
- Single NIC (~)
- No CPU overclocking
- Possible quality issues?
- Long term HW support

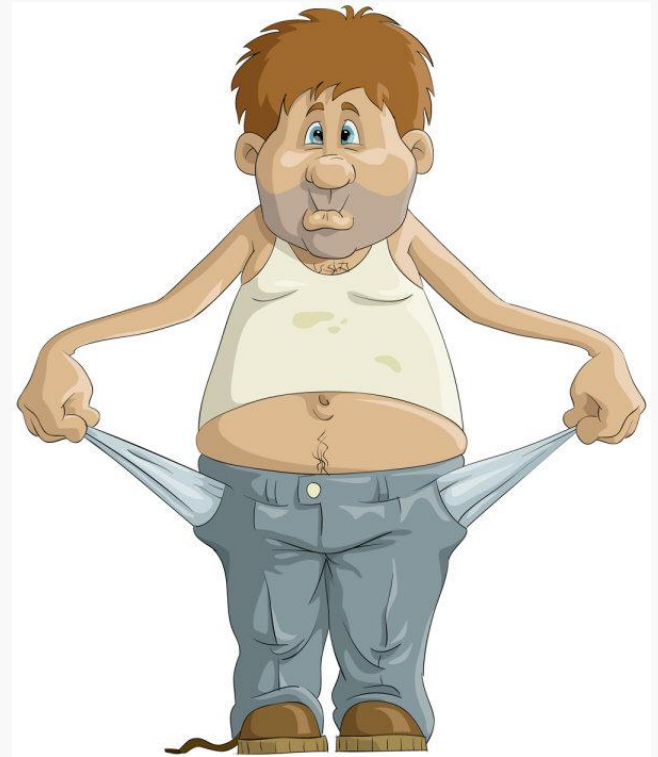
ADDING A SECOND NIC

- Currently testing Jetway Mini PCI Express NIC
 - Single (£30) and dual (£60) port options
 - Driver natively supported in ESXi (Intel i350)
 - Routing cables is an issue!
 - Some flakiness in initial testing



TYPICAL COSTS

- **Budget ~£120 + RAM**
 - Celeron 847 (Tested by @vPeteWalker) / N2820
 - 1.1GHz (16GB RAM) / 2.4GHz (8GB RAM)
- **Mid-Range ~£195 + RAM**
 - Core i3
 - 1.7/1.8GHz
- **High End ~£280 + RAM**
 - Core i5
 - 2.6/2.8GHz
 - vPro! (Ivy Bridge only - DC53427HYE)
- **Ultra High End £???**
 - Core i7
 - 3.1GHz
 - Not available in UK?



INTERESTING USE CASES

- @trainingrev
 - Using in production for a 5-user small business office!

<http://trainingrevolution.wordpress.com>

trainingrevolution.com

- Mutiny Technology:

- Small businesses plug-in and go networking appliance

http://www.mutiny.com/products/Next_Unit_of_Monitoring/



ALTERNATIVES

- **Gigabyte Brix (@phil_wiffen)**

- Similar form factor
- Similar prices
- NIC supported natively in 5.1 (not 5.5)
- Some fan noise
- <http://www.twistedethics.com>



- **Mac Mini (@lamw)**

- More expensive
- Louder
- Installs out of the box (Native)
- Can add Thunderbolt Ethernet Adapters
- <http://www.virtuallyghetto.com>



- **Bare Metal Cloud**

- Based on Autolab
- Short term study
- Watch out for long term costs
- <http://www.baremetalcloud.com>



EXTRAS

■ Storage Synology DS412+

- Very quiet
- Low power
- VAAI support (iSCSI)
- Synology SSD cache
- New features regularly (DSM 5.0!)
- 2-Year Warranty



■ Networking Cisco SG300-10/20

- Silent (Passive cooling)
- Low Power
- Layer 3 Managed
- LAG/LACP support
- Web & CLI
- Disable LEDs!
- Limited Lifetime Warranty



AND FINALLY...

- Lab runs on <100w
- Clone 8GB VM in 20 secs
- 18 VMs on one host (HA)

esxi02: VMware ESXi, 5.1.0, 799733

Summary Virtual Machines Resource Allocation Performance Configuration Local Users & Groups Events Permissions

General

Manufacturer:
Model:
CPU Cores: 2 CPUs x 1.797 GHz
Processor Type: Intel(R) Core(TM) i3-3217U CPU @ 1.80GHz

Resources

CPU usage: **899 MHz** Capacity: 2 x 1.797 GHz
Memory usage: **14442.00 MB** Capacity: 16284.55 MB

esxi02: VMware ESXi, 5.1.0, 799733

Summary Virtual Machines Resource Allocation Performance Configuration Local Users & Groups Events Permissions

Name	State	Provisioned Space	Used Space	Host CPU - MHz	Host Mem - MB	Guest Mem - %	VM Version
[Redacted]	Powered On	42.11 GB	14.79 GB	12	334	4	8
[Redacted]	Powered On	11.09 GB	4.46 GB	5	121	1	8
[Redacted]	Powered On	42.11 GB	16.68 GB	14	527	1	8
[Redacted]	Powered On	134.46 GB	9.63 GB	5	106	0	7
[Redacted]	Powered On	21.09 GB	9.05 GB	6	307	6	7
[Redacted]	Powered On	41.11 GB	15.30 GB	14	1024	3	8
[Redacted]	Powered On	19.09 GB	5.10 GB	12	275	1	4
[Redacted]	Powered On	87.09 GB	45.45 GB	57	2422	9	7
[Redacted]	Powered On	42.11 GB	14.71 GB	14	534	1	8
[Redacted]	Powered On	42.11 GB	42.11 GB	14	423	1	8
[Redacted]	Powered On	2.59 GB	1.43 GB	55	92	3	4
[Redacted]	Powered On	42.09 GB	21.45 GB	14	375	2	8
[Redacted]	Powered On	10.46 GB	981.66 MB	16	135	4	7
[Redacted]	Powered On	21.09 GB	4.71 GB	109	465	2	4
[Redacted]	Powered On	61.14 GB	34.73 GB	122	493	19	8
[Redacted]	Powered On	42.11 GB	13.32 GB	54	362	1	8
[Redacted]	Powered On	43.09 GB	36.89 GB	28	1970	7	8
[Redacted]	Powered On	62.44 GB	55.00 GB	349	3099	56	8

- Most Importantly...

REMEMBER:

It's all about the WAF!

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