Next business day (or whenever)

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HOW TO OWN A COMPUTER

So you buy computers

to implement services

to fulfil your mission

but the hardware breaks

service goes down

mission in jeopardy

what do you do?

SUPPORT CONTRACTS

Here is how it should work. We pay for the hardware plus a 3 or 4 year support contract with the vendor (or support organisation).

Something breaks, we call them up and the next day a support engineer shows up with parts to fix the machine.

(Or, a replacement part is shipped overnight and we replace it ourselves. We ship the defective part back using the same box and carrier.)

Speaker notes

Not to mention that calling them up and spending on hold on the phone is soul-grating agony. Even if you use a webform to file a case they insist on calling you up and asking pointless questions. Best case scenario is they won't ask for a firmware upgrade first.

CASE STUDY

Here is a virtual exchange with Support Unit™ based on real experience.

A COMPLAINING CONTROLLER

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Us: Thanks, that was quick

Speaker notes

Typical SAS based storage brick with 60+ drives and two independent controllers; all components hot-swappable and neatly labeled. Serial numbers were a source of confusion with the support unit, though.

(A LITTLE LATER)

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SU: OK, we will send you a replacement overnight

Us: thanks, good job

Speaker notes

This was beginning to feel like a pattern. I wasn't sure what to make of it; how did they program these supercaps to have a shorter lifetime than the support contract lasted? In all honesty a rapid replacement was not required here.

(A FEW WEEKS LATER)

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Us: Hey, another controller with the same problem?

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SU: Er, hang on, your controller will be there in *two weeks*.

(A FEW WEEKS LATER)

Us: Hey, another controller with the same problem?

SU: Er, hang on, your controller will be there in *two weeks*.

Us: ???

Speaker notes

In a chess game the question marks would be warranted for a move like this. Even if the issue was all but serious, what would have happened if the controller was **really** broken?

WHAT HAPPENED?

This case raises all kinds of questions:

- What went wrong?
- Will this happen again?
- Can they just get away with this?
- What are we paying for, exactly?
- How does this impact our operations?

THIS IS NOT A UNIQUE CASE

We've experienced an increase in cases where vendors do not meet the agreed deadline.

This raises some concerns; what is it we are doing here exactly?

THE CASE FOR HARDWARE SUPPORT

Speaker notes

Let's take a step back and look at why we take out hardware support contracts in the first place.

HOW TO TAKE CARE OF YOUR COMPUTER

- given that everything breaks at some point
- consider the consequences when it does
- who's problem is this anyway?
  - ours?
  - the manufacturer?
  - the vendor/integrator?

Speaker notes

We are not in consumer protection law territory so the rules are a bit different. I am not a lawyer but basically you always need to read the small print.

WARRANTY

- 'standard' warranty for x number of years
- dependent on manufacturer and component
- claim and replacement procedure may vary

Speaker notes

The manufacturer of your hard drive or memory module will guarantee it will keep working for a period covered by what is commonly called 'standard warranty', which is an illusory term. It commonly means that it is what you get without paying extra or 'extended' warranty. The actual price and term is set by the manufacturer who operates in the 'free market', another illusory term.

EXPECTED LIFETIME

Although it is possible to extend the warranty, the cost goes up with age[citation needed]. Vendors don't really like to support stuff endlessly…

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…but then again if a customer is willing to pay a high price this is a potential goldmine.

ECONOMIC LIFETIME

We buy hardware with the expectation to operate it for a number of years (typically 4). This is driven by the aforementioned price of support but at some points cost of operation catches up with the initial purchase in cooling and electricity. Although Moore's law no longer holds, there are still sufficient improvements in CPU speed and efficiency, data density, and network bandwidth to render hardware obsolete in half a decade.

COMMODITY VS. SPECIAL HARDWARE

Some components are generic and interchangeable

- hard drives (but mind firmware)
- memory modules
- network cards
- optics

But many are specific to the system

- motherboards
- power supplies
- switch/router modules

Speaker notes

Although it is possible to source some types of components on the open market even if systems are out of warranty, it can be complicated. Original components can fetch a high price on the second-hand market.

CLASSES OF SERVICE HARDWARE

Not all hardware is created equally.

Mission critical services go onto hardware with sufficient redundancy and resilience.

Less critical systems (worker nodes) often don't even get dual power supplies.

Speaker notes

We need to consider the different classes of hardware for various purposes.

The VM hosts that contain our entire virtual server park need to be highly available. Their storage backends (over the network on a storage cluster) doubly so.

Storage arrays that contain our customer's data need redundancy with multiple hard drives, i.e. RAID5 is not even going to cut it because we cannot risk a second drive failure while we wait for a replacement drive to finish its rebuild.

For the basic IT services (NFS home directories, e-mail) it is even more critical. But for these we at least have back-ups, which is not the case for the dCache storage.

IMPLEMENTING REDUNDANCY

- buying redundant hardware ($$$)
- stocking up on spare parts
  - but which parts? What if other things break?
- taking out paid support ($$)

SPECIAL HARDWARE

In some cases we don't really have much of a choice; critical storage and network systems operate with special hardware, hard drive firmware, network modules, etc. that cannot be sourced other than from the vendor.

This kind of vendor lock-in is undesirable but unavoidable for the higher tier equipment. The type of support is also the most expensive, as we need solutions within hours, not days.

COST/BENEFIT VS. RISK ANALYSIS

- cost/benefit considerations are less useful here
- taking a risk based approach:
  - risk of losing services
  - risk of losing data
  - risk of damaged reputation

Speaker notes

The cost/benefit calculation is fairly ubiquitous. Naively we just taken the cost of initial purchase plus the cost of the support contract for 5 years and write off the hardware in that time. The alternative is purchase, no contract and factor in the chance that you end up buying replacement parts at additional cost during the same period.

But it is not that simple. What if the thing that breaks is paramount to our operations? We could lose a lot of work/data /customers in the downtime while we try to source replacement parts.

The ultimate damaged reputation and eroded trust in our operations may be the ultimate high risk, because we could lose our position as a respected and valued partner. In our world that is almost a death sentence.

RISK MITIGATION

We could make sure we maintain availability by buying double the hardware up front so we have enough spare parts. But that is very expensive.

It is possible to mitigate some of the risk by taking out insurance in the form of a support contract. This takes care of getting replacements to you quickly so you don't suffer downtime (or not as much).

Speaker notes

Yes, you could also offload a lot of risk by going to the cloud. But that is like getting out of the game altogether, so I don't even consider it.

THE SWEET SPOT

Taking everything into account and with the right risk analysis we usually land on next business day support for most systems. We don't run a 24/7 operation anyway; some resilience goes into the design of the system to hold out for at least a few days for the most important systems.

WHAT HAPPENS WHEN THINGS GO WRONG

We have kept our part of the bargain by paying for support, but the support did not keep their end up.

What gives?

NO HARD DATA

We do not measure supplier performance when it comes to meeting their targets. I'd love to hear from people who do this.

We have seen suppliers struggle to deliver in the past; we've also seen marked improvement through restructuring and shaping up their support organisation.

WHY IS THIS HAPPENING

- No single cause
- logistics worldwide working on same-day shipping, why doesn't this work for us?
- no more weak links in the supply chain—they're all equally weak

Speaker notes

There is probably not a single cause for how supply chains break. The improvements in the field of logistics have been massive in the last decades and people keep shaving and optimising all the time. Overnight shipping is the norm, same-day shipping is the new thing.

Truth is that the supply chain no longer has a weakest link. There are no easy improvements, any time there is a hiccup this has resounding repercussions.

ECONOMIC COMPLICATIONS

- centralisation of warehouses
- overextended supply lines
- low stock
- difficulty in supplying stock

Speaker notes

Next business day is the promise to deliver a replacement part for a broken one by the day after we call them up. It seems fairly normal in this day and age where advances in supply chain management have made next day delivery the expected service for consumers and same day delivery rapidly gaining popularity. It comes at a cost, though.

Warehouse space is expensive; keeping items in stock is expensive.

Focus is on just-in-time processing throughout the entire chain. Any disruption in the chain will stop the entire thing in its tracks.

ADDITIONAL COMPLICATIONS

- global chip shortage
- High oil prices
- geopolitical unrest/war
- pandemics
- climate change

Speaker notes

This is just a flight radar snapshot I took the other day after talking to a logistics expert who mentioned the difficulties arising from the war in Ukraine. All air shipments from Asia now route through the Middle East, which adds challenges and complications.

IS THERE ANYTHING WE CAN DO?

A better use of ‘the five stages of grief.’

Speaker notes

The five stages of grief are pretty much debunked as a sensible approach to consoling those who suffered a loss. But it does serve a humorous purpose here.

DENIAL

This is not so bad, a little slip-up with few consequences and surely they'll do better next time

ANGER

We're not going to stand for this, you better shape up or else we will send in our lawyers! (Wait, do we have those?)

BARGAINING

OK so we don't really have a lawyer on retainer but you could at least try and talk to us and explain what went wrong? We can be really annoying when we keep calling you up and we could tell our friends how bad your service is.

DEPRESSION

This is not going to get better, is it?

ACCEPTANCE

THE PATH FORWARD

DEALING WITH THIS NEW REALITY

- refuse to buy from Bad Vendor™
  - ‘cut your nose to spite your face’
- open a dialog and work with them
- (move to the cloud)

Speaker notes

In the past we've actually blacklisted Bad Vendor™ by giving them a low factor in the bidding process. So we would favour the nearest competitor even if it was significantly more expensive.

The cost/benefit calculations are actually influenced by how much of our time is spent dealing with support. Jumping through hoops before even getting through to support, and them requiring us to be on the latest firmware all the time is something that eats into our most precious resource: time.

In some cases the simplest solution is to have spare parts in our own stock rather than relying on overnight shipping. And some vendors are ok with this approach as well.

LOCAL SPARE PARTS KIT

One vendor agreed to send us a collection of the most common spare parts for our systems.

In case we need a replacement:

1. use part from crash kit
2. open a case with support
3. wait for the shipment, send back replaced part
4. received part replenishes crash kit

NOT TAKING OUT A SUPPORT CONTRACT

For one class of worker nodes we went with 'standard warranty'

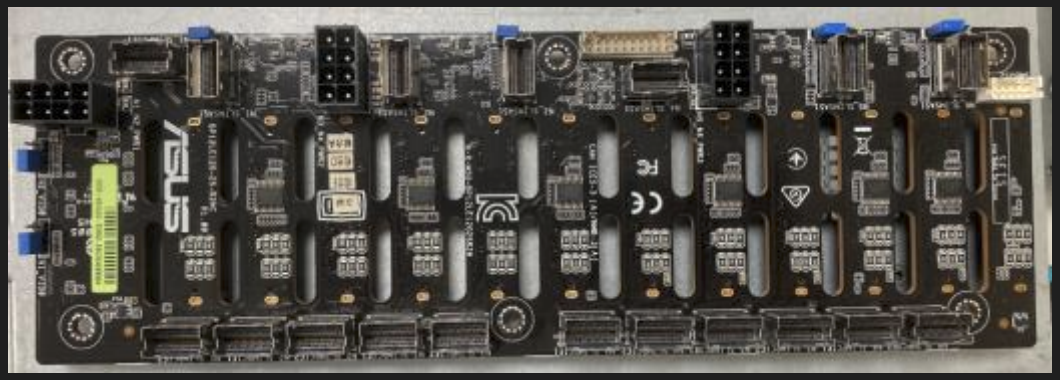
- different warranty conditions for different parts
- advanced replacement still an option

Speaker notes

In a particular case this hes lead us to buy expendable hardware (worker nodes) under standard warranty instead of taking out an expensive multi-year support contract. When things break we have a choice of just writing off the broken hardware or sourcing spare parts.

Different parts were under different warranty from different vendors: the hard drives were under warranty from the drive vendor, with the other parts under the chassis vendor.

BACKPLANE REPLACEMENT



Interesting case where defective backplane rendered one of six blades unusable.

- choice was between letting it go or replacing the part ourselves
- opted for replacement. About 1 hour work for two persons all told.

Speaker notes

This led to one interesting case where in a 6-node chassis the backplane stopped talking to both drive slots for one node slot. We ended up replacing the backplane ourselves, which was shipped overnight very quickly; the swap meant taking out around 20 cables and connectors but otherwise went smoothly. This cost us a couple of person-hours overall, but we got the worker node up and running again and we learned something along the way.

The cost benefit of having an engineer come over to do the work is actually limited, as the engineer will have to be directed into the data center and the other work around draining and restarting the machines has to be done anyway. You end up saving some time but not all.

The 'no support contract' option obviously does not work for all service categories.

CONCLUSIONS

We are living in interesting times.

Buying hardware involves taking into account what kind of support is going to be needed, but also the reality of how that support is organised.

Care to share experiences?