Episode Book

EPISODE #5521

Old Laptops as Home Servers: A Field Guide

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SYNOPSIS

Every tech enthusiast has one: an old laptop with a dead battery, too slow to use and too functional to bin. This episode walks through the full playbook for turning it into a real server — headless Ubuntu Server, the logind and consoleblank edits that stop a closed lid from killing your uptime, SSD swaps, and dust removal that restores a fifteen-year-old machine to factory thermals. Then there's the battery question, where the sources flatly contradict each other: is a battery permanently on AC a free built-in UPS, or a swelling fire risk boxed inside a hard shell with nowhere to expand? Both camps are right, just about different points in a battery's life. And for the people who look at all of this and reach for a hacksaw, there's the extreme end — a Lenovo W540 motherboard mounted in a 1U rack chassis running ESXi.

TRANSCRIPT



Corn

An old laptop with a dead battery is the most useless object in the house. Too slow to use, too functional to bin, and it just sits there in a drawer for four years.



Herman

Everybody has one. Usually two.



Corn

Daniel's got a whole prompt about it. Here's what he wrote in this week. He wants to look at the practice and art of converting an old laptop into a server. He says we talked before about building a dedicated backup appliance for a single job, and while that wasn't quite what he had in mind, an old laptop could probably do that job. He points out that tech enthusiasts tend to have one or more of these machines lying around with no clear purpose but a vague sense they could be useful.



Corn

It always is. Then he gets to the real question. He says a laptop is very far from an ideal candidate. Highly constrained form factor, weak hardware, and, more importantly, the whole device was built to run off a battery, with cooling designed for intermittent use rather than continuous operation. His understanding of the basic playbook was to remove the battery entirely. He always felt a battery permanently connected was a fire hazard, even though it could theoretically act as a UPS. So: if you pull the battery, can the rest of the hardware run continuously on AC power in its existing form factor? Or do people actually strip the components out and put them in a dedicated box? And finally, every part inside that laptop, from the motherboard to the power supply, was built with the expectation it would not be used this way. Are there inherent risks to repurposing it, or can it basically just work?



Herman

Four questions, and the last one is the whole hobby in a sentence.



Corn

So that's the scope. The playbook, the battery, the risks, and the extremes. Start with the recipe.



Herman

The recipe is boring, which is why it works. Headless Linux server install. Ubuntu Server 24.04 LTS is the default choice for most people. Enable OpenSSH so you never touch the machine again. Then you deal with the two things that make a laptop a laptop: the lid and the screen.



Corn

The lid is the whole problem, isn't it. Close it and the machine goes to sleep, and your server is a paperweight with a nice hinge.



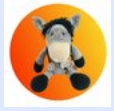
Herman

So you edit the logind config, set HandleLidSwitch to ignore. And for the panel, you add consoleblank equals sixty to the kernel command line so the display turns itself off after a minute. Inkyvoxel's write-up from May last year documents exactly that pair of edits. Lid closes, screen goes dark, machine keeps serving.



Corn

And the hardware prep?



Herman

Swap the spinning drive for an SSD. Inkyvoxel put it well, the machine wasn't running as quietly as they liked until the hard drive came out. That's the mechanical noise gone, and the heat gone with it. Blow the dust out of the fan. Consider new thermal paste if the thing is more than five or six years old. Then you pick a workload.



Corn

Which workloads actually make sense?



Herman

Jellyfin or Plex for media. Nextcloud for photo backup. A Minecraft server for the kids. Docker containers for whatever you're tinkering with. Proxmox if you want to run virtual machines. Pi-hole for DNS. Syncthing for file sync. There's a commenter on Hacker News running a 2014 Asus X550L with the battery pulled, doing Jellyfin, Audiobookshelf, Teamspeak, IRC bots, nginx and Syncthing. His report is that it sits under ten percent CPU and about twenty-five percent RAM unless he's streaming and transcoding.



Corn

So a twelve-year-old laptop is idling. Which tells you the hardware was never the bottleneck. The form factor is.



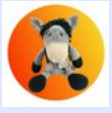
Herman

That's the whole episode, really. The silicon is fine. It's everything built around the silicon that fights you.



Corn

Let's do the thermals, because I think people underestimate this one badly.



Herman

A laptop's cooling system is designed for bursty desktop use. You open a browser, the fan spins up, you close the browser, it spins down. It was never asked to hold a steady load for weeks. There's a commenter, jraph, who put it bluntly: some laptops just heat too much and power off too often, especially in summer, and their hardware might end up dying quite fast. He adds that laptops are not really designed to be always on.



Corn

Summer is the part nobody plans for. You stick this thing in a cupboard in July and it cooks itself.



Herman

The Garbage PC project is the case study here. A Dell Inspiron N5110, and in stock form it tried to overheat playing casual videos off YouTube. Eighty-five degrees and climbing. The CPU throttles heavily once you hit eighty, so that's the soft ceiling for that model. The author replaced the thermal paste and pads, and it came down under seventy.



Corn

Fifteen degrees from a tube of paste.



Herman

On a fifteen-year-old machine, yes. That's not a tuning trick, that's restoring the thing to how it left the factory. And the most common cause of laptop thermal throttling is a choked fan. Dust. It's unglamorous and it's most of the problem.



Corn

What about the lid, once it's closed? Does that matter thermally?



Herman

It can. Inkyvoxel flagged reading that closing the lid may affect cooling efficiency, and it makes sense, the keyboard deck is part of the heat path on a lot of designs. You've turned the machine into a sealed sandwich.



Corn

So the ideal setup is a laptop with the lid open, screen off, sitting on a shelf, gathering dust it will then choke on.



Herman

That is the honest picture, yes.



Corn

Now the battery. This is the part where the sources disagree with each other.



Herman

And it's the most interesting split in the whole topic, because both sides are right about different things. The pro-battery case is simple. You have a built-in UPS for free. Power cuts out, the machine keeps running, no abrupt shutdown, no corrupted filesystem. Ismar Hrnjicevic wrote about this and initially loved it. Blackout happened, and it just continued to work.



Corn

That's a real benefit. A UPS costs money and takes up space.



Herman

It does. And then you get to the other side of it. Aging lithium cells develop higher internal resistance. They generate more heat when they're charged near full. And they swell. The hobby term is spicy pillows, which is funny right up until it isn't. Hrnjicevic disconnected his own battery after his mother's phone randomly caught fire one morning with virtually no warning signs.



Corn

No warning signs is the part that would get me. You can't inspect your way out of that.



Herman

And there's a specific structural problem in a laptop. The hard shell leaves no room for a swelling cell to expand into. In a phone or a tablet you at least get some visible deformation as an early signal. In a laptop chassis, the cell is boxed in on all sides, so the pressure builds and the thermal runaway risk goes up.



Corn

So the free UPS is a UPS made of the one component in the machine most likely to fail dangerously.



Herman

Ayush Pande at XDA put it about as directly as it can be put. Charging lithium-ion batteries around the clock when they're already at max capacity causes them to swell a lot faster than normal power cycles, and leaving the battery plugged in all the time is a recipe for disaster.



Corn

And the counter-position exists too. There's a guide out there telling people that dead battery you wrote off is a built-in UPS.



Herman

There is. And a commenter called kassner is equally blunt in the other direction. No, laptops don't have an inbuilt UPS. I recommend everyone remove the battery before using it plugged in around the clock.



Corn

Two flatly contradictory sentences, both delivered with total confidence. Which is the internet in miniature.



Herman

The thing is, they're not actually contradicting each other on the physics. One is describing what the battery does while it still works. The other is describing what it becomes.



Corn

Right. The disagreement is about time.



Herman

A battery that's two years old and healthy is a UPS. The same battery at eight years old, held at full charge, in a hot chassis, is a fire risk with a UPS function.



Corn

So what do you do if you can't pull it? Because on a lot of modern laptops you can't. It's glued in, there's no connector you can reach, sometimes there's no BIOS option to disable it.



Herman

You cap the charge. Sixty percent is the number that comes up. Inkyvoxel found a Dell UEFI setting for always plugged in on AC, and plenty of newer machines let you set a charge limit. But here's the honest caveat, and both sources say it. Capping reduces the risk. It doesn't take it to zero. Inkyvoxel wrote that they don't know if capping the charge limit prevents the fire risk or whether it's just better for overall battery health. Hrnjicevic agrees. Reduces the risk, still not zero.



Corn

That's a unresolved question and I appreciate that nobody's pretending otherwise.



Herman

And then there's Pande's solution, which I love, because it's a software workaround for a hardware problem that shouldn't exist. His gaming laptop has a non-removable battery and no BIOS disable. So he built an automation. Home Assistant, Glances reporting battery stats, and a nine-dollar Tapo smart plug. The plug cuts AC when the battery hits eighty percent and restores it below thirty.



Corn

He built a charge controller out of a smart plug and a dashboard.



Herman

He did. And it works. But notice what happened there. The machine was designed so you can't manage the battery, so he automated around the design. That's a person spending a weekend to recover a feature that a BIOS toggle used to give you for free.



Corn

Nine dollars and a weekend versus one line in a settings menu.



Herman

That's the trade anti-repair design pushes people into.



Corn

Okay. Question two from Daniel. Battery out. Does the rest of it run?



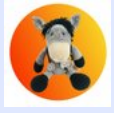
Herman

Generally, yes. Hrnjicevic confirmed the laptop could run off AC power by plugging it in and booting it after disconnecting the battery internally. Superuser answers say the same thing. You can remove the battery and run on AC alone.



Corn

Generally.



Herman

Generally. There are exceptions and they're annoying ones. Some laptops won't power on at all without a battery present. Some will boot and then shut off unexpectedly. There's a questioner on Yo Motherboard who reported that the last time they took the battery out, the laptop shut off unexpectedly and wouldn't turn back on.



Corn

So you find out by trying it. There's no list.



Herman

There's no comprehensive compatibility list, no. You open the machine, you pull the battery, you plug it in, and you learn something about your specific laptop.



Corn

And the second caveat is the one that would actually bite me in practice. No auto power-on after an outage on a lot of these machines.



Herman

Right. The Garbage PC author specifically wished for power-on with AC attach and didn't have it. Which means if you're running without a battery and the power blinks, the machine stays off until you physically press the button. You've removed your UPS and you've also removed your auto-recovery.



Corn

So the battery-free setup is more reliable in one sense and less reliable in another.



Herman

That's exactly the trade. No fire risk, no auto-restart. Pick your failure.



Corn

Which brings us to the people who look at all of this and decide the answer is a hacksaw.



Herman

And they exist, and they document it beautifully. avojak's build from November 2020 is the canonical one. He fully disassembled a Lenovo W540, confirmed it booted with no screen, no keyboard, no trackpad, then removed the motherboard, left it on its metal base mount, and mounted the whole thing in a one-unit nineteen-inch steel chassis, three hundred millimeters deep.



Corn

A laptop board in a rack.



Herman

He hand-made a longer power-button ribbon cable. He cut fan holes in the chassis. He permanently attached the original charger. It runs VMware ESXi.



Corn

And his verdict on his own project?



Herman

Is it powerful? Not really. Is this economical? No. Why not just buy a cheap workstation? Boring.



Corn

He answered his own question and the answer was boring, so he did it anyway.



Herman

That's the entire hobbyist motivation in four sentences. The Garbage PC project is the same spirit. Dell Inspiron motherboard mounted on four-millimeter plexiglass panels with brass standoffs, reusing the original power-button board. He hit display headaches and had to disable the internal outputs through kernel parameters, broke the USB and Ethernet extension board along the way, and used a 256-gigabyte SSD that he openly describes as having five known bad blocks.



Corn

Five known bad blocks. That's a man who has made peace with his storage.



Herman

Eight hours of work spread over a month, on parts that are about fifteen years old. And the framing he uses is that the machine was destined for the e-waste pile.



Corn

That's the actual motive. Not efficiency. Rescue.



Herman

And there's a cleaner version of the same idea. Framework laptops are designed for this. Ars Technica documented pulling a Framework mainboard out and putting it into a custom case or a 3D-printed enclosure to make a tiny desktop. That's the manufacturer meeting the hobbyist halfway.



Corn

Which is the difference between modding and repair. One is fighting the design, the other is using it.



Herman

Avojak is fighting a W540 that was never meant to leave its shell. The Framework owner is just using the product as advertised.



Corn

So what are the actual inherent risks, Daniel's last question. Battery aside, because we've done that one to death.



Herman

Thermal is the big one. Sustained heat accelerates the death of everything, the VRMs, the capacitors, the solder joints. Dust buildup makes it worse over time. Summer shutdowns are the visible symptom of a machine that's been cooking for months.



Corn

And drives.



Herman

Drives, yes. jraph flagged that the disk drives are constantly parking their heads and you need to make sure the parking policy is set correctly or you'll wear them out fast. That's a spinning-disk problem, and it's another argument for the SSD swap, since a solid state drive doesn't have heads to park.



Corn

Then the power-on behavior we covered. Some won't boot without a battery, most won't auto-start after an outage.



Herman

And that's roughly the list. Which sounds grim, but the summary position from the people actually doing it is more positive than you'd expect. jraph's own conclusion is that a solid laptop with its battery removed can work well as a server. And another commenter's line is that almost any old laptop from the past fifteen years could run and solve several home computing needs with little difficulty.



Corn

So the answer to Daniel's last question is: there are inherent risks, and they're all manageable, and the machine will basically just work.



Herman

With two asterisks. Pull the battery, and deal with the thermals before you deploy it, not after it shuts down in August.



Corn

And if you're going to run it for years, keep an eye on the power brick.



Hilbert

The brick is the part people get wrong.



Corn

Go on.



Hilbert

Everyone argues about the battery. The battery is the obvious one, it swells, you can see it, there's a whole vocabulary for it now. The adapter is the quiet one. I worked a summer at a recycling place, small operation, we took in corporate lease returns by the pallet. My job was triage. Test them, wipe them, decide resell or strip. We had a whole pallet of perfectly good machines, three years old, nothing wrong with them, and every single one had a swollen battery. We pulled them all and they went out as hazardous waste. That was the policy, nothing with a battery stayed indoors overnight. One cell goes and it takes the warehouse with it.



Herman

That's a lot of machines with nothing wrong except the one thing.



Hilbert

They were fine. That's what got me. I kept one. A ThinkPad, out of that pile. Ran it as a server at home for years. But the adapter is what I'd tell people to watch. Those old chargers, they drift. They're not regulated the way people assume, and as the capacitors age the output creeps up out of spec. I've seen more boards killed by a bad brick than by



Hilbert (continued)

a swollen cell. The cell makes the news. The brick just quietly cooks the input stage and one day the machine doesn't come on.



Corn

You're saying the failure that actually happens is the boring one.



Hilbert

The boring one is the one that happens. Nobody writes a blog post about a power supply that drifted two volts over nine years.



Herman

Did you replace yours?



Hilbert

No. Same adapter it came with. Still on it.



Corn

You just told us they drift out of spec and cook the board.



Hilbert

I did.



Corn

You're still running the original.



Hilbert

It's been fine so far.



Herman

How long is so far?



Hilbert

Long enough that I've stopped counting. The machine's been up about eleven years.



Corn

Eleven years on a power brick you've just described as a ticking bomb.



Hilbert

I keep meaning to swap it.



Corn

You keep meaning to.



Hilbert

There was one night the power went out and I thought, well, the battery's still in it, this is what it's for. Ten minutes. Laptop shut down anyway. The cell was so tired it couldn't hold anything. Best UPS I ever owned.



Herman

The battery that was supposed to save you couldn't, and the adapter that's supposed to kill you hasn't.



Hilbert

That's about the shape of it. Anyway. I've got someone waiting in the car park.



Corn

How long have they been waiting?



Hilbert

A while. They're fine.



Herman

The thing I'd flag from all of this, and it's the part nobody has data on, is how often any of it actually goes wrong. Every source says the battery fire risk is rare but real. Nobody has a rate. There's no failure data, no study, nothing. It's all vibes and anecdotes, including ours.



Corn

Which is strange for a practice this widespread.



Herman

It's not that strange. Nobody's tracking it. There's no registry of laptop servers that caught fire. You hear about the ones that do because they make a good photo, and you never hear about the thousands that just run quietly in a cupboard for six years.



Corn

The cutting-room floor item, and this one's good. There's no official playbook for any of this. No manufacturer guidance on running a consumer laptop as a round-the-clock server. The entire body of knowledge is personal blogs, forum threads and tech-press how-tos, written by people who did it and then wrote down what happened.



Herman

Which is probably why the advice is so much better than it would be otherwise. Nobody's selling you a support contract.



Corn

If you've got an old laptop gathering dust, the playbook is clear. Pull the battery, unless you can't, in which case cap the charge and accept that it reduces the risk without eliminating it. Clean the fan, replace the paste, put an SSD in it, and watch the thermals for the first month rather than the first year. And maybe don't trust a decade-old power brick just because it's been fine so far.



Herman

The one thing left open is whether capping that charge actually prevents the fire or just slows it down. Nobody knows. Inkyvoxel says so directly. Hrnjicevic says the same. Reduces the risk, still not zero. That's where the honest answer stops.



Corn

Thanks to Hilbert Flumingtop for producing. This has been My Weird Prompts. If you've done one of these builds, or you've got a laptop in a drawer right now that this episode just condemned or rescued, tell us about it. Email us at show at my weird prompts dot com.



Herman

We'll be back soon.