

WHITE PAPER

FUJITSU PRIMERGY TX100 S2 - 0-WATT SERVER

How does the PRIMERGY TX100 S2 achieve 0-Watts? A simple explanation.

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THE 'GREEN' PRINCIPLE

Fujitsu's PRIMERGY TX100 S2, which premiered in late July, shows the company stays committed to its goal of implementing green IT solutions anywhere, at anytime. The new entry-level server brings the company's 0-watt technology to small office backend systems. Anyone who kept an eye on expert discussions in recent years knows that two topics have absolutely dominated the playing field: cloud computing – and the building of environmentally sound IT infrastructures. While the buzz about the former toned down a notch, interest in the latter has not waned, mainly because investing in adequate equipment pays off (almost) immediately: running power-saving machinery cuts down the monthly electricity bill and thus leads to a noticeably lower TCO. Depending on the scenario, environment-friendly computers can actually help you save money instead of causing additional costs, like IT normally does.

THE 0-WATT CONCEPT

That was the starting position when Fujitsu introduced the first 0-watt PC at the CeBIT 2009. Its most outstanding feature was that it would draw absolutely no electricity after being turned off or spending a predefined amount of time on hibernate. That way it wouldn't waste power when not in use; however, admins could still define a time slot for each desktop to wake up at night and wait for eventual upgrades. With this solution in place, companies were able to realize savings of up to 20 euros per machine per year – a rather moderate amount at first sight, but one that adds up well if your network spans a few dozen or several hundred clients.

While the 0-watt PC was well received, the user community and Fujitsu quickly agreed that the concept had bigger potential. So the logical next step was to find out where else it was applicable beyond the desktop area, or more precisely whether servers could be modified in a similar way. The PRIMERGY TX100 S2 proves that under certain conditions this is very well possible.

USAGE SCENARIOS AND SERVER DEFINITIONS

The first question that needed to be addressed in the development process was if anyone would really benefit from a server with 0-watt functionality. The answer isn't quite as easy as it seems, because according to prevailing opinion a server never goes off duty unless it's due for repair or retirement (if you don't count power outages and the likes). In other words, it is meant to work 24/7 almost by definition. But how well does this definition hold out against the facts, i.e. existing everyday usage scenarios?

To those looking for a succinct reply, it has limitations. That's because "not all companies really need their servers to be running around the

clock," observes Jens-Peter Seick, Senior VP Datacenter Systems Product Division at Fujitsu Technology Solutions. This is particularly true for small to medium businesses that stay closed at night or over the weekends. But what's more, similar shifts are kept in numerous branch offices and departments of larger corporations. In all of these environments, most stationary IT systems are only active for the smaller part of the day, namely between 9 AM and 6 PM. In the 15 hours between closing time and start of work, the servers aren't needed and nothing happens. Nothing – except that the servers usually continue to run in idle mode. As a result, they still waste power and money, and a good deal of both.

To better understand why this is still the case, we have to look at a few basics and at one or two common beliefs about servers. First off, thanks to many improvements in hardware technology and server management in recent years – in particular hot-plugging, hot-swapping and remote repair capabilities – flipping the power switch has become nearly obsolete: administrators no longer cut a system from the circuit unless it's absolutely unavoidable. Consequentially, many have come to rely on software tools especially where mundane tasks such as 'system start/stop' are concerned. The problem with this approach is that, in terms of power management, these tools often don't fully utilize their potential.

IMPROVEMENTS IN POWER MANAGEMENT

This, in turn, has to do with the fact that the vast majority of systems out there do not exploit all of the ACPI options at hand. ACPI – the open standard for power management in x86 systems – generally knows seven "global states" a computer can enter:

- G0 (or S0) – working;
- G1 – sleeping, with four 'sub-states' ranging from S1 (flushed caches, CPU not working) through S2 (CPU powered off) and S3 (Suspend-to-RAM) to S4 (hibernation or Suspend-to-Disk);
- G2 (or S5) – "soft-off": the system obviously no longer works, but some components remain active so it may be woken with a tap to the keyboard or over the LAN; and finally
- G3 – "mechanical off": this is the state formerly reached by pressing the on/off button; power consumption is zero, and the system can be safely taken for maintenance.

Under regular conditions, all computers – servers and PCs alike – will switch to G2/S5 after being turned off. However, the active components still cause an electric flux of 1 to 2 watts – too much for a system that's supposed to draw nothing. The waste of power is obvious, as is the loss of

money: each ‘insufficiently deactivated’ PRIMERGY TX100 S2 server will cost a company between 35 and 40 euros p.a. in a typical configuration, with a good chance of steady increases in upcoming years.

THE PRIMERGY DIFFERENCE: ZERO POWER CONSUMPTION, FULL SECURITY

By contrast, Fujitsu’s new PRIMERGY TX100 S2 takes full advantage of the ACPI options: the system reverts to G3 mode after being turned off, and that means it consumes no electricity at all – 0.0 watts.

Therefore, even a small firm can save on power. In addition, greenhouse gas emissions are also reduced, which by itself is a positive factor now that customers, employees and public authorities have become environmentally aware.

Still there are a few more important issues to consider. From an administrator’s point of view, the most important question is if regular nightly maintenance has to be carried out during office hours. The answer is no: just like a 0-watt PC, the PRIMERGY TX100 S2 can be configured to ‘wake up’ at a given point each night to run backups– and return to 0-watt mode after a predefined period has passed without input. Another concern that can be heard is that switching off a server will in some way harm its reliability and/or shorten its lifespan. For a state-of-the-art server generation like the TX100 S2 that comes close to an urban legend, as these systems have been thoroughly tested and can sustain up to 5,000 on/off cycles. Assuming they run an average 220 working days per annum, that means they could last for nearly 23 years; even in a 24/7 scenario, they could work for 13.7 years. Finally, an argument in favor of the 0-watt technology that should not be overlooked is that of increased security. Cyber-criminals often use idle periods to launch their offenses against systems and networks, and the easiest way to prevent such attacks is to take a server offline – provided of course it’s well-protected otherwise. In other words, if you are looking for an entry-level server that performs well, saves power and costs, and is secure, then the PRIMERGY TX100 S2 is for you.

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