



Reliable and cost-effective hosting for Drupal and WordPress websites

As enterprise web applications evolve from simple collections of content to interactive information systems with many moving parts, they require more comprehensive, faster and more robust hosting infrastructure. However, operating this hosting infrastructure has traditionally been complex, time-consuming, and costly.

In the same way that hosted software applications, or Software-as-a-Service (SaaS), offer significant advantages over the client-server model, freistilbox as a fully managed hosting platform provides a simpler, more powerful and more cost-effective deployment model for business-critical web applications.

freistilbox is a distributed enterprise hosting platform optimized for the two leading open-source content management systems, Drupal and WordPress. It is designed to meet all three primary demands of business-critical websites:

- ▶ **Performance:** freistilbox can handle hundreds of concurrent web requests.
- ▶ **Scalability:** freistilbox makes it easy to add capacity on demand.
- ▶ **Fault tolerance:** freistilbox stays operational even if single components fail.

freistilbox provides near-100% uptime to hundreds of websites owned by organizations of all sizes, ranging from NGOs and universities to global brands and enterprises.

In this white paper, we outline the details of the freistilbox architecture, and the benefits you can reap from making it your website's managed hosting platform.

About freistil IT

freistil IT Ltd, the company behind freistilbox, is a distributed team of web operations experts. It was founded in 2009 by Jochen Lillich, a veteran systems administrator, software engineering trainer and IT manager. Having led IT teams at some of Europe's biggest internet companies such as WEB.DE and 1&1, Jochen saw an opportunity to break the mould of the commodity web hosting business by specifically catering to the requirements of business-critical websites built on the open-source CMS Drupal.

At the 2010 Drupal Developer Days conference in Munich, freistil IT launched its first specialized web hosting solution named DrupalCONCEPT. It immediately garnered the interest and business of both Drupal website owners and web agencies because of its innovative cloud architecture designed specifically for Drupal-based websites.

In 2012, freistil IT expanded the scope of its enterprise-class hosting services with their new hosting platform, freistilbox. Additional to Drupal, freistilbox also supports WordPress, the open-source content management system that powers more than 50% of the global web.

Long before the advent of the GDPR, data protection was already a central consideration in the design and operation of freistilbox. That's why freistil IT has always been running the major part of its hosting infrastructure, which consists of many hundred Linux hosts, in data centres in Germany.

By automating every aspect of platform operations from server provisioning to failure mitigation, freistil IT was able to not only keep its headcount low, but also to meet legal regulations that require auditable processes and documentation.

While freistil IT Ltd is registered in Ireland, its team is distributed across various EU countries. With more than a decade of experience in running a remote-only business, freistil IT not only follows but helps define the best practices of distributed teamwork.

From the start, freistil IT has been an active member of the Drupal and WordPress developer communities. Following these projects closely is key to maintaining a leading position in the market. As an expression of its core values, freistil IT in return supports these communities not only financially but also by contributing know-how in the form of web content and talks at conferences like WordCamp and DrupalCon.

And as its customers will be happy to confirm, freistil IT applies the same philosophy of mutually beneficial business relationships to them, too.

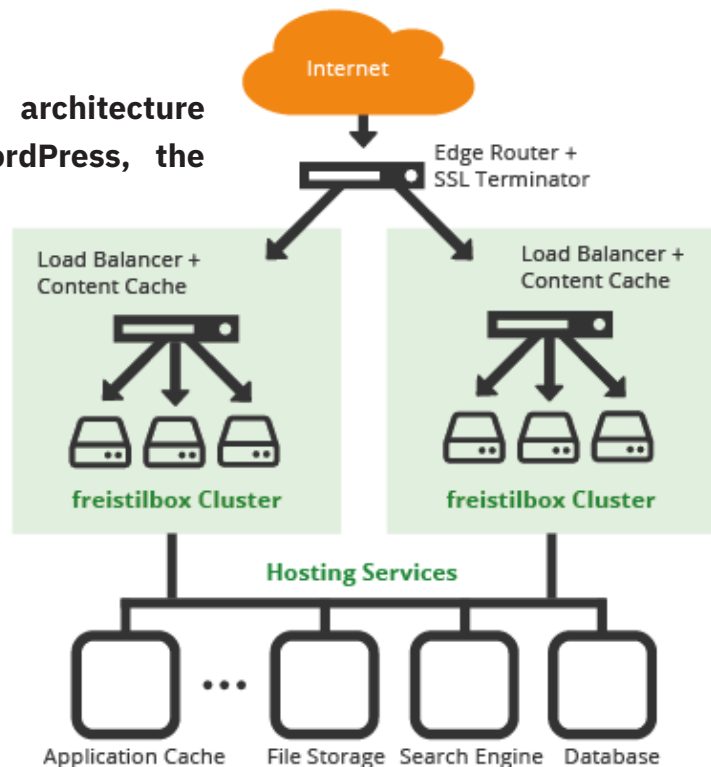
Enterprise-Grade Web Hosting Architecture

With its distributed service architecture optimised for Drupal and WordPress, the freistilbox hosting platform is far superior to conventional web hosting offerings when it comes to performance, scalability and fault tolerance.

On normal day, freistilbox handles between 30 and 50 million web requests. It can achieve this level of performance thanks to its sophisticated IT architecture.

As you can see in the diagram, web requests from the internet get processed not by a single web server but by a distributed system of interconnected web hosting services, each fine-tuned for its specific purpose.

We chose this architecture because it allows our customers to add capacity on demand, and ensures website uptime even during maintenance or partial system outages.



Request routing and SSL termination

For each incoming HTTP request, an *edge router* first identifies its destination website and the freistilbox cluster responsible for serving its content. The edge router also provides the computational power required by encrypted TLS/SSL traffic, taking load off the following stages. Qualys SSL Labs regularly awards us an excellent rating for the security level of our edge routers.

The actual content delivery is handled by the customer's dedicated *freistilbox Cluster*. This cluster consists of a content cache, a load balancer, and a set of application servers that run the actual Drupal or WordPress code.

Code execution

At the core of each freistilbox cluster is a group of application servers that run the website's application code (i.e. Drupal or WordPress, including all extensions and customizations). Web developers deploy code updates directly from their version control system with a single command; freistilbox takes care of distributing them to all relevant servers.

We've greatly simplified managing hosting capacity for our customers by reducing the number of performance parameters to a single value called PU, short for "processing unit". Each incoming web request gets processed by one of these processing units. As soon as the desired content has been rendered and sent back to the website visitor, the PU is free to process the next request. The number of PU determines how many requests a freistilbox cluster can handle at the same time. For example, a cluster with a capacity of 16 PU will be able to handle 16 concurrent HTTP requests.

Even though our application servers are highly optimized for fast content delivery, freistilbox can additionally reduce response times (and hosting expenses) by orders of magnitude by means of its content caching service.

High-performance content cache

The freistilbox content cache, based on the open-source software Varnish, is located in front of the application server group. Every request coming in from the edge routers and every response generated by the application servers pass through this service.

Based on rules provided by the web application, the content cache stores every request with its corresponding response in memory. It can then identify requests that have been cached previously and, instead of passing them on the application servers, send out the cached response immediately. Since it serves these responses right from memory, the content cache can handle hundreds of requests per second. This minimizes not only the website's content delivery time but also the load on the application servers and therefore the required PU capacity that drives hosting cost.

HA database cluster

Both Drupal and WordPress applications store their raw website content in a database. Since a single page request can require hundreds of individual database operations, freistilbox uses dedicated MySQL clusters equipped with fast solid state disks (SSD) and ample buffer RAM. Continuous data replication between database server nodes ensures near-100% service availability.

In-memory object caches

Using a memory-based cache to store and retrieve internal application state can increase processing performance by orders of magnitude, and reduces overall system load. freistilbox offers Memcached and Redis as application-level cache services.

File storage network

Website asset files are stored on a file storage network based on a distributed high-performance file system. Each file is stored with triple redundancy; in other words, should a storage node fail, there will be at least 2 other copies of its files still available on the storage network. The cost of operating three times the usable storage space is well worth the increase in system resilience.

Content indexing

The search functionality built into Drupal or WordPress is not adequate to serve content-rich websites. freistilbox provides a better alternative in the form of a high-performance search engine based on the proven Apache Lucene and Apache Solr technologies. Not only does Solr reduce search time even in huge content bodies to fractions of a second, it also adds functionality like faceted search (i.e. iterative filtering of search results based on content metadata).

CDN support

For websites that require optimum performance on a global scale, freistilbox supports the use of external content delivery networks (CDN) such as CloudFlare and Fastly.

Many hosting platforms allow traffic to be routed through a CDN but do not enforce this. This allows attackers to circumvent the CDN and access the website by explicitly addressing the hosting platform. freistilbox, on the other hand, can grant exclusive access to the CDN alone via “Authenticated Origin Pulls” using TLS client certificates.

Direct system access

Each freistilbox Cluster comes with a dedicated login server that developers can access via the Secure Shell protocol. This server allows the manual and scheduled execution of tasks required for website maintenance and data management.

Operational Excellence

Highly sophisticated hosting infrastructure is only one part of the freistilbox value proposition. It is complemented by our site reliability engineering (SRE) team, responsible for the 24/7 operation of a vast IT infrastructure across multiple data centres.

Service-specific infrastructure optimization

While most other hosting providers in the Drupal and WordPress space rely on (and are limited by) cloud services that are managed by vendors like Amazon Web Services, freistil IT leases only the raw compute infrastructure (i.e. servers and VM instances) from their data centre partners. Every hosting service, be it web servers, caching proxies, databases, storage systems or search engines, is then set up and operated by freistilbox engineering. That way, we are in full control of every single component, its features and performance.

For services like databases and file storage that are critical for the hosting system's overall performance, we take a "bare metal" approach: High-quality server hardware using enterprise-grade disks and ECC RAM delivers the throughput our customers want.

Where system elasticity is more important than raw power, freistilbox benefits from fully automated cloud infrastructure. This makes scaling the capacity of a freistilbox cluster up (or down) a matter of seconds.

Fully managed hosting platform

To achieve speed, scale and reliability, and also to ensure compliance to internal and external regulations, the freistilbox hosting infrastructure is managed almost exclusively by automated IT processes. All necessary system management tasks are implemented as software built in-house using modern DevOps practices. This "Infrastructure as Code" approach avoids manual infrastructure changes by engineers, and thus minimizes both execution time and operational risk.

For the few remaining instances that require manual intervention, the freistilbox SRE team follows documented standard operating procedures (SOP).

Continuity management

Thanks to redundancies built into every level of our hosting infrastructure, freistilbox reaches excellent service uptime despite the inevitable technology failures and necessary maintenance work. Even customers who have not signed up for an Enterprise SLA get to enjoy a website uptime exceeding 99.9% in most months.

We monitor our hosting infrastructure 24/7 and collect more than 100,000 performance metrics per minute to analyse the health and capacity of our services. If a hosting component operates outside its normal parameters, the monitoring system alerts our on-call engineers via text message and phone call. After incidents affecting one or more customers, we issue an incident review with detailed information about its cause and what we will do to prevent it in the future.

With the performance metrics we collect, we can not only analyse service degradations, but even take preventative measures before they occur.

We maintain a comprehensive backup solution that includes web application code, database content and static files. Each backup is retained for a minimum of three days. Customers have the option of extending backup retention time and can create additional off-site backups.

By using redundant uplinks to a variety of traffic exchange hubs, our data centre partners ensure the continuous high-speed data exchange with the global internet.

Security management

All freistilbox servers run Ubuntu Linux Server Edition as their operating system. Its Long Term Support (LTS) guarantees feature and security updates over a five-year life span. Emergency cases such as intrusion attempts or zero-day vulnerabilities get escalated to company leadership and handled as top-severity incidents.

Our data centre partners employ best practices for data centre security. Data centre locations are not discernible as such from the outside and are geographically distributed. Site access is monitored by CCTV, granted only after checking credentials (passport) and authorization, and supervised by data centre personnel.

Network infrastructure is secured on multiple levels. Intrusion detection and traffic management allow the fast mitigation of attacks.

DevOps collaboration and support

There is a fundamental realization that we at freistil IT turned into a core aspect of the freistilbox business model. It is the fact that the demands and complexity of modern web applications leave no space for the antiquated separation between development and operations, where the software is built on one side, gets handed over, and is then kept running by the other side. If a web project is to be successful today, it needs to practice a DevOps approach in which web development and operations engineers collaborate over the project's entire life cycle.

The knowledge and experience our SRE team has gathered over decades, extending beyond our own hosting infrastructure to the inner workings of Drupal and WordPress, makes it an invaluable resource for our customers' development teams.

Taking the role of an external IT department, our site reliability engineers are available to customers via email, online chat and video call. Every day, they advise developers in all aspects of the application life cycle, ranging from source code versioning to multi-stage deployments, from database query optimization and improving cache efficiency to web security.

Continuous improvement

The success of open-source software in general, and Drupal and WordPress in particular, is based on the steady stream of innovation created by their developer communities. With every major release, they introduce new features that improve and extend the business potential available to website owners. More often than not, these features do require changes to the underlying hosting technology and its operational processes. That's why, next to providing technical support, we made it the main responsibility of the freistilbox SRE team to continuously adapt our managed hosting service so our customers and their development teams can benefit from newly created opportunities.

Behind the scenes, we also keep up with the evolution of server hardware and cloud technology by steadily upgrading our IT infrastructure. Our customers notice these improvements in their hosting experience, but neither from website downtime nor from an increasing hosting bill.

Gain an unfair advantage!

Here is a summary of why freistilbox is your ideal hosting solution.

Developer efficiency

- ▶ Git-based deployment
- ▶ One-click staging instances
- ▶ Minimal time-to-release

Website availability

- ▶ High-availability hosting architecture
- ▶ 24/7 monitoring and incident management
- ▶ 99.9% uptime guarantee with our Enterprise SLA

Content delivery speed

- ▶ High-performance hosting services and CDN support
- ▶ Scalability on demand
- ▶ Regular infrastructure upgrades included

Operational excellence

- ▶ Designed and operated by industry veterans
- ▶ DevOps support directly from our SRE team

Total cost of ownership

- ▶ Complete coverage of all web operations aspects

If you have questions or would like to request a quote,
simply send us an email to info@freistilbox.com!