



“Swedish ISP Com Hem used Varnish to power seamless OTT live and VoD video streaming, manage growing amounts of data and to build their own CDN.”

Case Study:

# Com Hem



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# We launched **Varnish** on a Friday afternoon right before streaming a big sports event, and it worked flawlessly

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## Background

ISPs throughout Europe look for ways to remain commercially and technically competitive while providing service quality and customer satisfaction. Com Hem aims to do this by offering reliable, fast service across their offerings, differentiating their offer and of course securing customer retention and growth by leveraging their individual strengths. One of these strengths is their continual technology innovations, aimed at anticipating the needs of the market and the trajectory and trend of the technology they use.

One major component of ensuring continued growth and innovation is Com Hem's drive to offer seamless streaming video. As a market-leading provider of TV and high-speed internet, Com Hem is well-prepared to manage the technical and growth-related challenges as they come. Nevertheless, implementing the right tools to future-proof the platform and ensure flexible, continued development put Com Hem at a crossroads. With more users demanding speed, seamless streaming of live and VoD OTT video and instant access to streaming video across all their devices, Com Hem's need in taking their platform to the next level with a video-streaming solution required both flexibility and the ability to cope with the inherently unpredictable nature of user demand (i.e. both peak traffic during predicted events as well as unexpected traffic spikes). Com Hem needed a solution that could offer scalability and the kind of flexibility that would enable growth and speed without being confined by "black box" products that lacked options for customization.

## Com Hem at a glance

### Company

Com Hem Group offers broadband, TV, play and telephony services to Swedish households and companies. Their powerful and future-proofed net work offers speeds up to 1 Gbit/s, covers half of the country's households, making the Com Hem Group an important driver of creating a digital Sweden. They bring their 1.45 million customers the largest range of digital-TV channels and play services via set top boxes as well as on-the-go for tablets and smartphones.

### Challenge

Com Hem wanted to offer seamless, reliable, high-performance OTT (live and VoD) video streaming by building their own DIY CDN with which to serve and control content.

### Varnish solutions for Com Hem

- Started using Varnish Cache as an image CDN and web accelerator for apps and TV services. Turned to Varnish subscription in 2017 to create DIY CDN exclusively for video streaming services.
- Professional expertise/support from Varnish core developers
- Using Varnish High Availability to replicate cache data; Massive Storage Engine; Hitch/TLS/SSL
- All HTTPS streaming is done through Varnish Streaming Server; traffic is constantly and exponentially growing

## The Challenge:

Tasked with continuously looking toward the future to prepare services for delivering the next level of user experience, the team responsible for Com Hem's video streaming infrastructure needed to find a more flexible video streaming solution.

A few activities formed the framework of what Com Hem wanted to achieve:

- **Developing** a pure HTTP video streaming CDN/streaming platform to serve and control their traffic, taking advantage of their own load-balancing capabilities alongside cache replication and cache storage routing based on content
- **Replacing** existing video streaming technology with a more flexible, customizable solution at more transparent, predictable price point
- **Managing** a large amount of data with room to grow
- **Protecting** the backend/origin from being overloaded during peak traffic periods/big events

Varnish lets us manage the same data using different kinds of requests from the same cache. This saves bandwidth and cache capacity. With Varnish we can tune to our needs and optimize our cache. Varnish gives us this flexibility to control the flow in a very neat way.

*Adam Palmblad, TV Architect, Com Hem*

## The Solution:

### **Flexible control of content and streaming with flexibility: Building an in-house DIY CDN and leveraging control of caching logic**

Com Hem had a streaming-server solution in place already, but it did not offer the flexibility they needed to grow. This streaming server would not only have forced them to cede more control of their content and how it was delivered but would have added prohibitive new costs to their video streaming operations. The prospect of ballooning expense coupled with diminishing flexibility and control could no longer serve Com Hem's needs, which led their team to search for a way to take back control, both of content and costs. In their search, they found Varnish.

### **Back to basics: Cache control**

With this in mind, one of the first drivers for Com Hem in seeking out Varnish was the transparent and flexible approach to caching; ultimately, Com Hem could completely control how they cached their content. With Varnish, Com Hem delivers OTT live content, catchup/VoD content, and though they are delivering the same data, the requests are different, which saves a great deal of cache capacity.

### **Bottom line: Cost control**

Cost of video delivery is a big consideration, particularly when the amount of video you serve continues to grow. Cost/pricing motivated the initial shift to choosing Varnish from a business perspective. Varnish has offered Com Hem a full suite of flexible solutions at a flat rate, while other solutions tacked on additional costs for additional licenses or features while offering less flexibility.

## Results: Go your own way: Building a self-managed video streaming CDN solution implementing Varnish: how, when, what

### How and when

When Com Hem investigated its options and settled on Varnish, they discovered that implementation was fast and easy, particularly with the support of Varnish Software's engineers. A working design was ready within a month, and with two or three more months of extensive testing and methodical planning and discussion, the solution went live. The Com Hem team knew that the old solution would have failed under the load of an upcoming sporting event and, with full confidence in the Varnish solution, they moved all traffic over to the Varnish solution at once without a more conservative, incremental migration period.

According to plan, the Varnish implementation was immediately put to the test when Com Hem launched it on a Friday afternoon ahead of a big, live sporting event; Varnish served the video seamlessly. Varnish worked under load conditions and has continued to perform ever since.

### What

Com Hem has been streaming on the web for four or five years, and although historically, they have seen low figures in terms of data, this has begun to grow rapidly and exponentially in the last year. Early in 2017, when Com Hem adopted Varnish, Com Hem knew that existing capacity would not be sufficient for future demands. When Varnish entered the picture, Com Hem saw an average of about 5GB per day, which has jumped to peaks of 60GB (expected to continue growing).

About a quarter of Com Hem's traffic today is served from the backend. Varnish manages this handily with the capacity to expand as Com Hem requires. As traffic for Com Hem is mostly live (VoD consumption is likely to increase considerably in coming months with the introduction of a new video rental service), it makes sense that hit rates are highest for this type of traffic.

Naturally, streaming traffic can be unpredictable. Com Hem does employ a sophisticated, granular monitoring system to oversee bitrates, where traffic goes, flows and so on, but this is not yet implemented in the Varnish data center, so predictive analysis of streaming-specific traffic is something that is coming in the future once this granular-level monitoring is deployed for the Varnish servers as well. In the meantime, having Varnish in place means that sudden traffic spikes, though unpredictable, will be manageable.

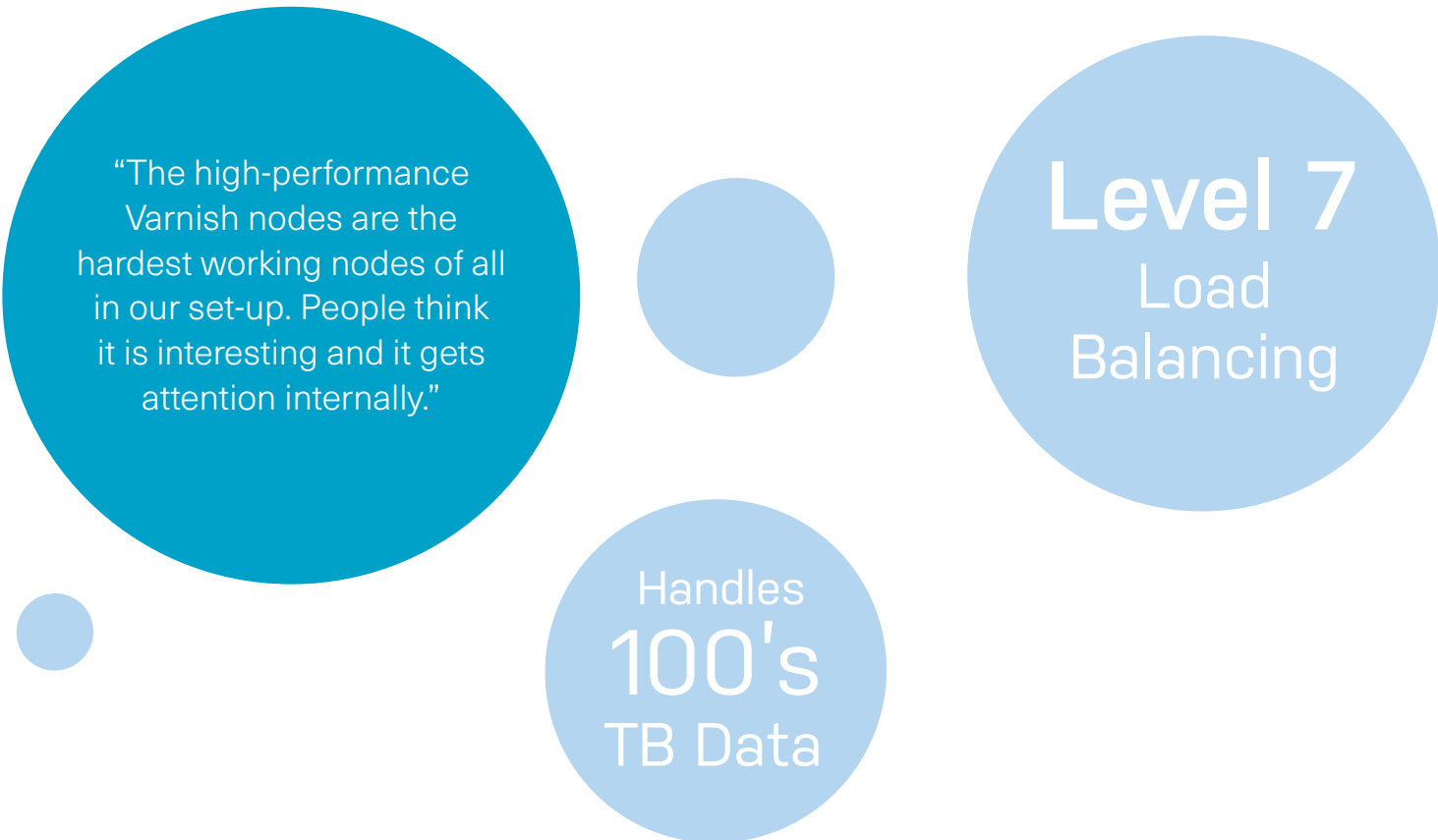
"Varnish performs exactly as promised, and that is the benefit. Things will not break, regardless of traffic spikes. We launched Varnish on a Friday afternoon right before streaming a big sports event, and it worked flawlessly."



## Future-Proofing: through a do-it-yourself approach Varnish enables an all-in-one solution

Fundamentally, Com Hem benefits from the flexibility they have gained not just by being able to do what they want today, i.e. creating a robust video streaming solution and building their own self-managed CDN, but in being able to foresee future needs and adapt for them using existing Varnish features. As they see traffic volumes grow, Varnish expands to accommodate. Overall, by adopting Varnish and using Varnish design, Com Hem has been able to reduce the number of components in the whole solution, leading to a simpler, more streamlined and self-managed approach, all without additional investment.

- Caching and edge logic is now in Com Hem's hands, so they can respond with agility to changes in broadcast and OTT. The Varnish Configuration Language (VCL) unlocks unlimited potential for configuring the kinds of policies and rules that suit Com Hem's own needs, particularly when they need to do specific things in specific streams. VCL enables Com Hem to get closer to the end user implementing logic at the edge (speed and more granular personalization).



"The high-performance Varnish nodes are the hardest working nodes of all in our set-up. People think it is interesting and it gets attention internally."

Level 7  
Load  
Balancing

Handles  
100's  
TB Data

- Com Hem adopted a straightforward and very fast load-balancing approach. They didn't want to implement another complex technology to handle load balancing (as they were trying to streamline and simplify). Without going into too much detail, with Varnish, only the caching layer needs to scale even as bandwidth needs grow.

But they also wanted level-7 load-balancing so that caches are efficiently used (that is objects are not copied all over the platform, but only on a pair of servers). This was handled by allocating servers into colour groups (red, blue, etc) and each request was "hashed" into a colour (identical requests get hashed into the same colour). If a server gets a request matching its colour, it serves that request from cache or goes to the backend. If the colours don't match, Varnish acts as a load balancer, bypassing its cache and routing to a node with the right colour.

- Varnish Massive Storage Engine (MSE) ensures that as the demand for VoD grows, persistent storage is available for long-term storage and already delivers a better ability to decide what to cache and what not to as well as simplifying configuration of and dimensioning of the server. While Com Hem does not yet need to use MSE to its full potential, this will become necessary as customers begin to access the VoD library and select from it more sporadically (i.e. the long tail of content). On the Com Hem platform, users can choose and play whatever content whenever and wherever they wish, up to two weeks in the past, which is a lot of data for 150 channels (i.e. 100s of TB of data that make up the live startup and start-over content). The functionality of MSE will become more and more important as time goes on because of the growth in VoD content.

- Varnish High Availability (VHA) adds robustness and stability from the beginning, ensuring resilience. VHA is important for their CDN design to ensure that the information within each cluster stays in sync. They can also take down one node with less impact. VHA also enables Com Hem to do stateless design, which means they do not need a load balancer. VHA is one component that contributes to how Varnish is a safety net that prevents catastrophic failures when a site is overloaded with traffic.
- Varnish has TLS/SSL support for HTTPS with Hitch. All content providers (e.g. Apple, Android) require HTTPS streams. Com Hem needed to ensure HTTPS streams, but this, too, was a feature that would have created additional expense in added hardware needs in order to serve the same capacity (or, without new hardware investment, HTTPS would reduce current server capacity by half, which was untenable).
- Along with the open-ended flexibility to create what they needed, Com Hem found the support they received from Varnish engineers to be both tactical and consultative, helping them to get the most from their Varnish subscription at the same time as making their set-up more robust and future-oriented. After implementation, Varnish support has continued to respond quickly to questions as they arise."

## The Future

Com Hem will continue to work with Varnish features and VCL to further develop and tune their video- streaming CDN solution. In addition to working more with MSE for storage needs, they hope to look at session handling, introducing a kind of tokenized system for authenticating and authorizing access to content another function Varnish can handle. Indeed the idea is to introduce more Varnish functionalities into the setup, as that is where everything is happening.

"Although VCL adds a slight learning curve, it is where the magic happens and it is totally crucial. VCL allows for valuable flexibility, for example, in ad replacement".



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