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FROM CDN TO EDGE CONTENT DELIVERY: QUANTIFYING THE BIG OPPORTUNITY

Webinar: Questions and answers

From CDN to Edge Content Delivery: Quantifying the Big Opportunity

This document outlines the questions and answers received from the STL Partners and Varnish Software webinar, 'From CDN to Edge Content Delivery: Quantifying the Big Opportunity' which was hosted on Thursday 16th March 2023.

You can watch the recording of the session, and also access the slides, using the [link here](#).

If you have any questions not addressed in the webinar or this Q&A document, or want to hear more about our research findings or from our speakers, please contact:

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Webinar questions and answers

The below questions were received from the webinar audience during the live session.

Post-webinar questions and answers

1) How do you differentiate "precision control and monitoring" and video analytics? Don't they go hand in hand?

STL Partners: *Video analytics is about extracting information from video streams – e.g. about the nature of a crowd of people, the quality of a product etc. This is clearly a prerequisite for then being able to take an action – later or in real-time. For precision monitoring and control a real-time feedback loop is required so that a machine can be immediately adjusted. This is true automation and will likely develop after video analytics (which does not de facto require a real-time response) has scaled as a solution.*

2) How much can edge content delivery can help tailor 'per customer' services?

STL Partners: *Caching content and running analytics compute near the customer enables personalisation because it both lowers the cost of moving data from a central location to the customer (it is already nearby) but also means that each customer can receive a personalised website experience without excessive buffering.*

Varnish Software: *It depends on the type of service you're trying to personalize. It usually involves offloading some calculations from the origin server and doing them on the edge. This could be offloading the login procedure and keeping track of the user session. This information could be used to show account information or to display the shopping cart. For APIs you could offload the authentication process and verify authentication tokens on the edge. For OTT video streams (HLS, MPEG-DASH, CMAF) you could manipulate the playlist files on the edge to personalize the stream. One could even inject custom ads. In general, the level of personalization depends on the input you're using to segment or personalize and the desired outcome. You can use request information (cookies, accept headers, accept-language headers, geographical information, network information, ...) and either use that to create different cached variations of a certain page.*

3) The 'edge' looks to be similar to 'central' in the slides, shouldn't it be closer to the site?

Varnish Software: *The point is that the edge is as flexible as you need it to be. Depending on your use case, the edge could be in the same data centre as your origin. The edge is where you need the acceleration. If you're trying to protect your centralized servers from being overloaded, this could be one of our edge sites. But if you have a specific audience in a specific geographical region, you'll also install an edge site there to reduce latency and assure network throughput via the network they're connected to. The conclusion: edge CDN capabilities allow you to place edge sites wherever you want them.*

4) What are the video functionalities of your products provided for video streaming services? Just caching, or do you run any computation-intensive tasks over your edge-based CDN?

Varnish Software: *While we offer a fully integrated software solution, we aren't boxing ourselves into a single use case. We offer a toolbox to accelerate and personalize any kind of HTTP workload: from website, to API, to file sharing platform, to an OTT video streaming service.*

The Varnish Configuration Language and the ecosystem of Varnish Modules allow you to modify every aspect of the HTTP request & response flow. For video we primarily focus on the video playlists to personalize the experience.

We currently do not offer any modules to modify the binary video files. We do offer a module to compress JPEG or PNG files into WebP.

But as always: if there is enough demand and a good enough use case, we can develop a module that does certain optimizations or personalizations on the video footage itself.

That being said, from a performance standpoint we much rather solve problems by creating multiple variations of the content and use more space in the cache as a result, than to use a lot of CPU cycles to achieve the same result.

5) You talked about software-defined CDNs; Do you have any controllers for this? If so, how can it use idle resources of different CDN's to make, for instance, collaboration b/w them?

Varnish Software: *We actually do have a controller to manage a software-defined CDN. Within that controller (which is called Varnish Controller) we integrated another product called Varnish Traffic Router. As the name suggests, this routes traffic to the right Varnish servers or to an external endpoint.*

For our own Varnish servers, we can measure bandwidth usage and compare that to the bandwidth capabilities of the NICs on that machine. That way it is easy for us to track idle resources and send requests to machines whose NICs aren't fully saturated.

If you want to expand this and add external CDNs to the mix, tracking idle resources is a bit more complicated. Out of the box, Varnish Traffic Router has no awareness of bandwidth usage on servers it doesn't track. But thanks to our Varnish Traffic Router's, plugin system, you could write a grpc-based routing plugin that does checks on the external CDN and has the ability to route traffic to that CDN.

6) How are you handling the discovery of compute/storage edge compute nodes?

Varnish Software: *Every Varnish server is automatically discovered, but can also be tagged. Every deployment is associated with a set of tags. This way you can create various caching tiers, each with their own responsibilities.*

Within the VCL configuration of the compute nodes (which we refer to as the edge nodes) we can define custom routing logic to reach the second tier that represents the storage layer. We typically use consistent hashing to ensure that every cache miss on the edge tier ends up on the same node on the storage tier. This allows you to scale your storage tier horizontally.

7) A number of vendors propose solutions which can run on the centralized cloud with an acceptable latency performance. Do you have any comments on this?

Varnish Software: *The term "edge" can be used in a very flexible way. Basically it refers to the outer tier of your web platform. The goal is to geographically spread content to reduce end-user latency, increase throughput and uptime.*

If a cloud vendor has data centers close to where the end-users are, then this is also considered "edge".

The same flexibility seems to be applied to the term "centralized" as well. The entire premise of the Cloud is the fact that resources are distributed for the sake of elasticity, scalability and resilience. Even though it looks like everything is hosted in one centralized place, behind the scenes there's a lot of systems hosted in a lot of different locations.

Regardless of the terminology we use to describe an architecture, it all boils down to this: put resources as close as possible to the end-user to avoid latency. If a cloud

vendor can achieve this, great! If not, you might want to add caching servers in other places to supplement your Cloud vendor's coverage.

8) How will open caching democratize CDN?

STL Partners: *Our belief is that open caching is a natural extension of the disaggregation of hardware and software in content distribution. Sites that are open, by definition, become aggregation points for content and so lower content caching costs and improve the customer experience. The best content delivery solutions should rise to the fore – innovation should win out – just as it should for telecoms network infrastructure as it opens up. Clearly, making this happen is challenging and there are existing legacy players that are likely to resist this move!*

9) What level of inter-agreement for space and infrastructure with MNO's will the CDN need to secure to deliver the content over edge infrastructure?

STL Partners: *This question has both a technical and commercial angle. From a commercial perspective, STL believes that an agreement needs to be reached that enables the necessary hardware and software to be deployed at the telco site. The telco could charge the edge content delivery player for renting space and/or hardware or offer this freely in exchange for a share of revenue generated from the content provider. There are range of commercial models available and the edge content delivery player and telco need to agree a model that works for both parties based on appetites for risk and reward!*

10) With lots of competition over content streaming, there is always a challenge to optimize costs. How is edge content delivery taking care of this concern - investing on edge infrastructure (increased CAPEX) vs. competing on optimizing costs with other CDN providers?

STL Partners: *Clearly, the decisions about taking on great investment and risk in return for upside in terms of revenue share and lower distribution costs for the telco must be evaluated against the low investment option/risk of working with a CDN at the internet exchange at the edge of the network. This is a case by case decision and very hard to give a single answer – it depends on a number of factors that a business case would need to consider.*

11) How does security work in this context? What are the benefits and disadvantages in comparison to the cloud?

Varnish Software: *Varnish is software and can run in the cloud or on-prem. From an infrastructure perspective securing underlying networks and hardware is the same for any cloud vs on-prem solution. You either trust the cloud provider to secure things or you trust your internal teams to do it. We support both. From a feature the primary feature cover*

- *Encryption*
- *Web App Firewall (WAF)*
- *HTTPS Support*

This is not meant to be an exhaustive list but gives you a high level overview of the primary security features.

12) You told in the beginning that the revenue size of media will be bigger than retail and finance. Do these statistics relate only to data amount, or other aspects?

STL Partners: *The graph relates to the forecasted revenue size in verticals. When looking at the revenues, we have taken factors such as connectivity, the different types of hardware devices used in that vertical, the application itself (calculated based on an estimation of the recurring application fee which the end user has to pay for the relevant use case.), whether that use vertical needed integration & support as well as other metrics.*

13) Do you consider edge efficient only for live video, or also for VoD with require huge storage capacity?

Varnish Software: *Edge CDNs can be efficient for both live & VoD. For live content it's a matter of defining an acceptable segment length and ensuring that the network behind your edge services is fast enough to keep up. Even with an OTT video segment length of just 1 second, the network shouldn't have an issue sending over a video segment every second. The edge nodes will ensure that the upstream network and infrastructure isn't overloaded during live streaming.*

For VoD there's slightly more tolerance to initial buffering. However, Varnish Enterprise's "Massive Storage Engine" (MSE) has the ability to keep up with VoD demand at scale with very low latency.

MSE is specifically designed for caching and it eliminates some of the typical performance bottlenecks when reading from and writing to disk. We do this by not storing every object in a separate file.

MSE features a combination of memory-based storage for hot content and disk storage for long tail content. The storage on disk uses pre-allocated large files with custom filesystem-like behavior. This takes away a lot of the responsibility of the OS kernel, which is not optimized to handle cache workloads at scale. MSE also has anti-fragmentation features that ensures long tail content remains fast.

MSE is especially useful for VoD workloads. See <https://info.varnish-software.com/massive-storage-engine> for more information.

15) The only difference between your 'traditional' and 'edge' architectures is the presence of some storage in the mobile data centre. On one hand some mobile networks already host third party CDN's. On the other hand, the data centre isn't especially close to the user edge. Can you clarify how much closer to the user edge you see CDNs moving compared to today?

STL Partners: *We expect the volume of third-party solutions to increase as hardware and software is disaggregated which offers more flexibility for deploying solutions (and lower cost). The location will depend on the use case – currently locations are normally at aggregation points or, for real-time solutions, they could be on-prem. As low latency requirements rise and edge content delivery solution deployment costs fall, we expect the network edge to become increasingly popular for caching and compute.*

16) Is Varnish software re-designed for edge? And is it a virtualized software?

Varnish Software: *Varnish started as a caching solution, a reverse proxy designed to sit between the origin and client. Everyone has a different definition of the EDGE but the commonality is being as close to the point of consumption as possible. Based on that definition Varnish has always been an EDGE solution and works the same way in an internal or external network.*

It is highly configurable via a markup language called VCL and supports ESIs (Edge Side includes). Varnish Cache, the open source solution is used by Fastly and Lumen to run their Edge services. Varnish Enterprise, our commercial solution adds additional plugins (VMODs), and the ability to add on Controlling and Content Routing via a web-based UI or RESTful interface.

17) Is Varnish's solution HIPAA and GDPR Compliant?

Varnish Software: *Our solution is software based and installs on servers you control either in your data centre or in the cloud. It supports encryption in flight and at rest and uses in-memory or object-based storage so the actual content of data do not need to be based on identifiable information, however, HIPPA and GDPR compliance are based upon the customer's internal compliance controls.*

Get in touch:

If you have any questions intended for Varnish Software or would like to learn more about their solutions, please contact:

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