

# AVI APP INSIGHTS:

## Using a Software Load Balancer for Application Monitoring, Security, and End User Intelligence

## THE "PRIVILEGED" POSITION OF THE LOAD BALANCER

The load balancer is an essential application and networking service for traffic management, SSL termination, content-switching, and caching. It occupies a strategic position in the network, inline with application traffic between end users and the servers. However, traditional load balancers have become single-purpose appliances that narrowly focus on passing traffic and are not architected to take advantage of their location in the network. They are not built as intelligent application services that collect data and provide analytics.

## A SOURCE OF APPLICATION INTELLIGENCE

In many enterprises, a common challenge is the time required for resolving trouble-tickets submitted by application teams and internal users. Network engineers and architects are often frustrated by the need to search through log files and TCP dumps, or set up span ports to troubleshoot networking issues. Given the location advantage — in the path of application traffic — a software load balancer can be a significant source of application insights. With the right architecture, the load balancer can be a powerful tool for the network team and their troubleshooting tasks.

## **AVI VANTAGE PLATFORM – MODERN DISTRIBUTED ARCHITECTURE**

The Avi Vantage Platform is an intent-based application services solution. The architecture (see Figure 1) separates the data and control planes to deliver application services beyond load balancing, such as real-time application analytics, security, and monitoring, predictive autoscaling, and end-to-end automation for L4–L7 services.

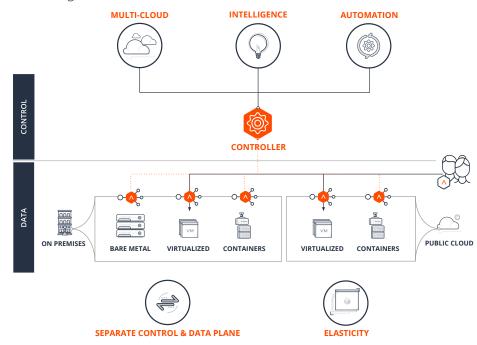


Figure 1: Avi Vantage Platform – High-level Architecture

## **AVI APP INSIGHTS**

The Avi Controller centrally manages the Avi Service Engines that continuously collect millions of application telemetry data points. The Avi Controller processes the data in real time to deliver unprecedented application insights without impacting load balancer performance. The Avi Console displays these application analytics in three broad categories — application performance, security, and end user data. Avi App Insights is an industry-first application intelligence capability that delivers actionable insights to administrator and application owners.

#### **Application Monitoring**

Using intelligent machine learning, a cumulative health score (see Figure 2) is calculated based on application performance, resource utilization, security posture, and any anomalous traffic patterns. A health score of less than 100 alerts administrators to review and fix potential issues in the application.

#### **End-to-End Timing**

Avi App Insights displays the round-trip time at each hop in the network from client to backend application (see Figure 3). This level of visibility reduces troubleshooting time to minutes and significantly shortens the time for initial discovery (and potential bouncing back-and-forth) among teams. Avi services real-time and actionable analytics, which is critical to resolving hard-to-reproduce issues and ensuring a non-disruptive user experience.



Figure 2: Application Health Score

Client	Client RTT 135ms	<b>NVI</b>	Server RTT	Server	App Response 150ms	App	Data Transfer 1ms	Total Tim 287ms
	200		200		Response Code			

Figure 3: End-to-end Timing for Faster Troubleshooting

#### Network DVR and Searchable Traffic Logs

To view historical application traffic analytics, users can choose from the following options: Real Time, Past 15 minutes, Past 3 Hours, Past 6 Hours, Past Day, and so on (see Figure 4). Network administrators can review application traffic information, identify network or application issues, reduce trouble-ticket resolution times, and eliminate the need to reproduce failure scenarios. Specific transactions are easily analyzed using Google-like search criteria with over 50 predefined search parameters. For example, log files can be filtered by HTTP response codes, client devices, client location, app response times, and more.

Applications     Deshboard     Virtual Services     Pools		<ul> <li>(?) I swarna (Demo)</li> </ul>
← Virtual Service: Scaleout-VS	<u>∞</u> ∦ /	×
		Summaries 🗸
Analytics Logs Health Clients Security Events Alerts	Displaying Past 15 Minutes	
response_code+200 × Google-like	Past 15 Minutes	Log Analytics –
Search capability	Past Hour	Browser
	Past 3 Hours	Client OS
Total 11504 Logs	Oct ! Past 6 Hours	
	O No Past Day	Device
		End to End
	հետրություն	Host Header
1150 1154 1156 1156 1157 1158 1159 1150 1151 1	152 11:53 11:54 11:55 11:56 11:57	HTTP Version
Timestamp Client IP 2 Latencies between Request 2 Response Latencies between GET 200	Length © Duration Timeline ©	IP Address
each network hop		Location
	Response Data Transfer Total Time Oms App 25ms 28ms	Referer
	ponse Code	Request Length
Client IP: 10.130.162.37:33403 + Virtual Service IP: 10.130.128.35:443 Server Conn IP: 192.168.193:31506 + Server IP: Scaleout-VS-poi	ol:Server1 (192.168.1.95:80)	Request Type
Location: Internal End time: 2016-10-05, 11:56:56 am		Response Code
Operating System: ? Unrecognized Service Engine: Avi-se-aecok (vcou 0)	Request Information	Response Content Type
Device: Computer Response Length: 100.7 KB Host: 10.130.128.35		
Browser: Q Unrecognized Significance: Connection abnormal SSL Version: TLSvL1 event: server unanswered syns URI: /100k.dat	39 B)	Response Length
Certificate Type: ECDSA User Agent: ApacheBenci	h/2.3	Server IP Address
Perfect Forward Secrecy: True	Response Information	Sinnificance

Figure 4: Application Analytics with Network DVR and Searchable Traffic Log

#### Security Insights

Users can analyze digital certificates used, TLS versions, and overall SSL score based on several criteria (see Figure 5), as well as real time and historical data on DDoS attacks (L4 and L7) and blocked connections.

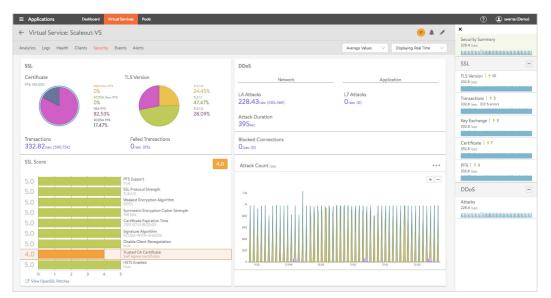


Figure 5: Security Insights with Real-time Data

#### Log Insights

Network administrators can analyze aggregate traffic statistics based on specific log criteria, such as distribution of client browsers, devices, IP addresses, URLs, and more (see Figure 6). These are pre-configured analytics modules that derive insights beyond the network into clients and applications.

	May 29, 2018 4:04	Q C © Export 4:04 AM - May 29, 2018 10:04 AM ignificant Logs Significant Logs			Log Analytics Client Analytics Load Balancer Analytics Request Analytics		
RL Paths			>	•	SSL		
IRL Path	# Logs	% of Logs			Referer		
/imgs/logo.png	2488	26.1			URL Path		
/imgs/conversion.js	1839	19.3			ORL Path		
/	1533	16.12%			Host Header		
/imgs/header.png	1223	12.8			HTTP Version		
/assets/avi.webm	1167	12.2			Request Length		
/cnn.html	559	5.88%	]				
/natgeo.html	516	5.43%	]		Request Type		
<no-data></no-data>	41	0.4			Response Code		
/apple-touch-icon-precomposed.png	4	0.0			Response Content Type		
/imgs/l	4	0.0			Response Length		

Figure 6: Log Analytics Pre-configured Modules

#### **Client Insights**

Users can browse through end user statistics, including average page load times, percentages of transactions by device type, browser, and operating system, and top URLs accessed (see Figure 7).

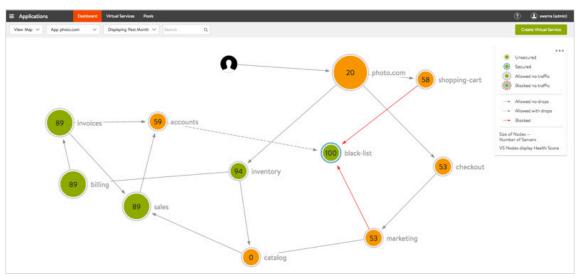
Filter by device-,										
Analytics Logs Health Clients Security Events Alerts	browser-, and OS-types			Average Values V Displaying Real Time V						
Client Dimensions (Clear Filters)			$\sim$							
Location	Device		Browser		Operating System					
	1. 🖵 Computer	85.71%	1. 💿 Chrome	69.64%	1. 🗯 Mac OS X	69.64%				
	2. 🗆 Tablet	8.93%	2. D Mobile Safari	14.29%	2. 🔹 iOS	14.29%				
	3. D Phone	5.36%	3. 🕭 IE	10.71%	3. 🗱 Windows 8.1	10.71%				
			4. 🕑 Firefox	5.36%	4. 🗱 Windows 7	5.36%				
	Top URLs	Top URLs								
	1. https://10.130.128.11/	1. https://10.130.128.11/				Resource Timing				
	2. https://10.130.128.11/imgs/conversion.js				9.26%	Resource Timing				
	3. https://10.130.128.11/cnn.html			7.419		Resource Timing				
	4. https://10.130.128.11/assets	/avi.webm			5.56%	Resource Timing				
1. 🔤 India 25.00%		. https://10.130.128.11/imgs/logo.png			3.70%	0% Resource Timing				
2. 🔤 United States 25.00%	5. https://10.150.126.11/imgs/									
3. 🐏 Canada 18.75%	6									
4 Singapore 15.63%										
5. 🔤 Saudi Arabia 15.63%	Top URLs accessed by clients									
Filter by leastion										
Filter by location										

Figure 7: Client Insights

### APP MAP AND INSIGHTS FOR CONTAINERIZED MICROSERVICES APPLICATIONS

Avi App Insights provides visual insights into inter-app communications in a container-based microservices application deployment. These relationships (captured in the Application Map, see Figure 8) are highly complex and ephemeral due to the nature of containers. Avi handles both ingress (north-south) and intra-cluster (east-west) traffic management and provides real-time visibility with:

- Application Map graph of microservice relationships with latency, connections, and throughput information
- Monitoring on 100s of metrics per microservice instance
- Full HTTP log analytics with Google-like search
- Health score and insights for each microservice
- End-user insights for north-south (external) traffic



#### **Figure 8: Application Map**

With Avi App Insights, network administrators have a powerful tool to identify and resolve application issues. It eliminates finger-pointing when application issues occur and promotes collaborative problem solving. In addition, the closed loop feedback from the analytics engine enables on-demand scaling up (or down) of load balancers. Application teams benefit from gaining actionable intelligence about end users and their experience accessing and using the application.