A Health Assessment Method for Business Full-Link on Cloud Platform

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Abstract: The current business health assessment on the cloud platform is rather one-sided and unable to achieve a full link from VM to network egress. Based on the physical link and logical link of the cloud platform, the activity path of business flow is found, and the whole link model of end-to-end business flow is established. Subsequently, according to the importance of the business VM and the health of each redundant node on the link, the health analysis model of the business end-to-end full-link is calculated.

Keywords: Business link, link health, health assessment model, business routing path

1 INTRODUCTION

The position of the cloud platform in enterprise IT construction has become irreplaceable. Existing literature, monitoring and health assessment of business on the cloud platform are generally one-sided, fault analysis is relatively isolated, and end-to-end assessment of business cannot be achieved[1][2]. The existing solutions have the following defects: 1) the health analysis of business systems is not comprehensive, containing only a single dimension or several dimensions[3]; 2) the analysis dimensions are relatively independent, and no end-to-end full-link analysis model is established; 3) the dynamic adaptability is not good, and the business health analysis cannot adapt to the changes of the network from a global perspective[4].

Since there are two kinds of links on the cloud platform, one is the physical link and the other is the logical link. Physical links are connections from one device's physical port to another device's physical port. In the production environment, two physical devices are logically defined by using main and backup, stacking, M-LAG and other technologies to form a logical device in business logic, and the link between logical devices is a logical link. Logical links are attached to physical links, which are generated by one or more physical links through a certain protocol, providing load balance and link redundancy at the link layer surface. Logical links are logically regarded as a link, which can generally be realized by smart links, lacp, etc. The

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physical and logical links of the cloud platform are the bases of the model analysis, which is relatively simple and will not be elaborated on in this paper.

Based on the physical and logical links, a full link health assessment model for the service has been established and is currently being applied to the construction of the cloud platform monitoring system.

2 THE METHOD OF ESTABLISHING AN END-TO-END SERVICE FLOW FULL LINK MODEL AND IMPLEMENTING A SERVICE HEALTH ANALYSIS

2.1 A Full-Link Routing Path Analysis Method for Business Traffic

Business traffic is divided into northbound & southbound traffic and eastbound & westbound traffic. Eastbound & westbound traffic is the internal traffic of the cloud platform, which will not affect the overall link health of the business due to relatively simple analysis and relatively easy investigation. Therefore, this paper focuses on the analysis of the situation from end-to-end of the full link of northbound & southbound business traffic[5] [6].

The northbound & southbound traffic of the business will pass through the north and south firewall for security management and control. The security management and control of business access to the external network within the cloud are realized by defining the firewall security policy rule and security domain zone. There are two directions of business flow, i.e., accessing the cloud business traffic from the cloud external networks and accessing the traffic of the cloud external networks from the cloud business. Business flow includes two directions, namely, accessing intra-cloud traffic from each network outside the cloud and accessing the intra-cloud traffic from each network outside the cloud. To this end, a business access flow data table is established, and the analysis method for business northbound & southbound access items is shown in Figure 1.

For mutual access between cloud internal business and cloud external network elements, it needs to develop a special rule in the firewall. Each rule defines a type of internal and cloud external mutual access. By analyzing each rule, all the mutual access entries can be obtained.

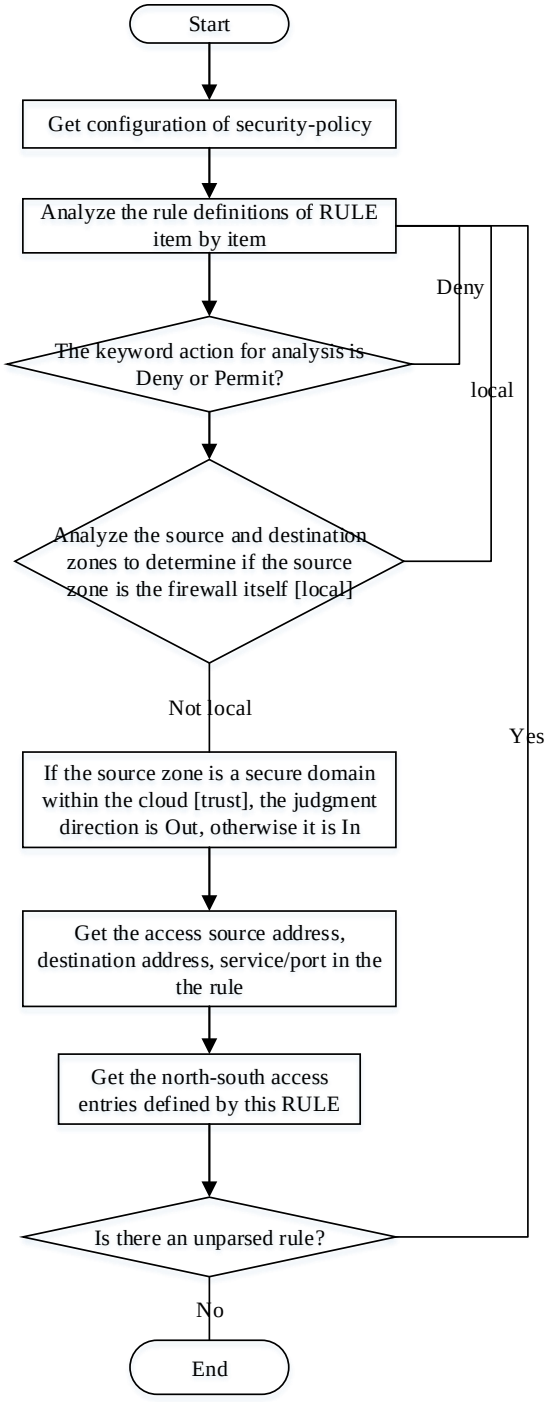

Figure 1. Analysis Method of business northbound & southbound access items

- It is required to analyze whether the keyword of the action is “permit” or “deny”. If the word “deny” appears, it means access is denied;
- If the word “permit” appears, it means access is permitted;By analyzing the keywords source-address and destination-address, access to source and destination IP, as well as access to businesses/ports can be acquired;
- Through analyzing the keywords source-zone and destination-zone, directions across security domains can be accessed.

Business Northbound & Southbound access entries generated are shown in Table 1:

Table 1 Generated Business Northbound & Southbound Access Entries

Local IP	External IP	Security domain of external IP	Flow direction
192.168.0.1	12.34.X.X	Untrust	IN
192.168.0.1	137.3.X.X	DCN-VPN1 (Public network defined at the group level)	OUT

For each business access entry in Table 1, the dynamic full-link routing path is calculated for each entry as shown in Figure 2.

- By means of the interface provided by the virtualization platform, we find the VM and the host where the VM is located according to the local IP address of this end to obtain the virtual switch where the VLAN of the VM is located. It is possible to obtain the uplink logic link to the virtual switch according to the method described in Figure 2, and obtain the active link currently used as well as the uplink TOR logic device according to the uplink configuration strategy.
- It is available to obtain the routing table on the corresponding TOR logic network device, obtain the current routing entries corresponding to the current local IP and the opposite port IP, find the logical outlet of this device based on a regular expression, and acquire the next logical device and logical port by the method described in Algorithm 3.
- If the EOR switch defines the business VPN, the routing algorithm first obtains the VPN corresponding to the VLAN of the VM and finds the routing entry within the VPN. Then the next logical device and logical port can be obtained using the description of the algorithm in Figure 3.
- For other network devices, recursive algorithms 1 to 3 are used until the last hop of the exit router reaches the CE device.
- For the routing analysis of the main and backup relationship, such as the firewall, as well as the main and backup routing of the export router to CE, one is to judge the priority of the routing entries, and the other is to judge the main and backup roles of the two main and backup devices dynamically.

Eventually, a northbound & southbound full-link routing path is formed for the cloud platform's internal business[7]. The routing path in the network changes dynamically. If there is a device failure, routing will pass through another redundant device.

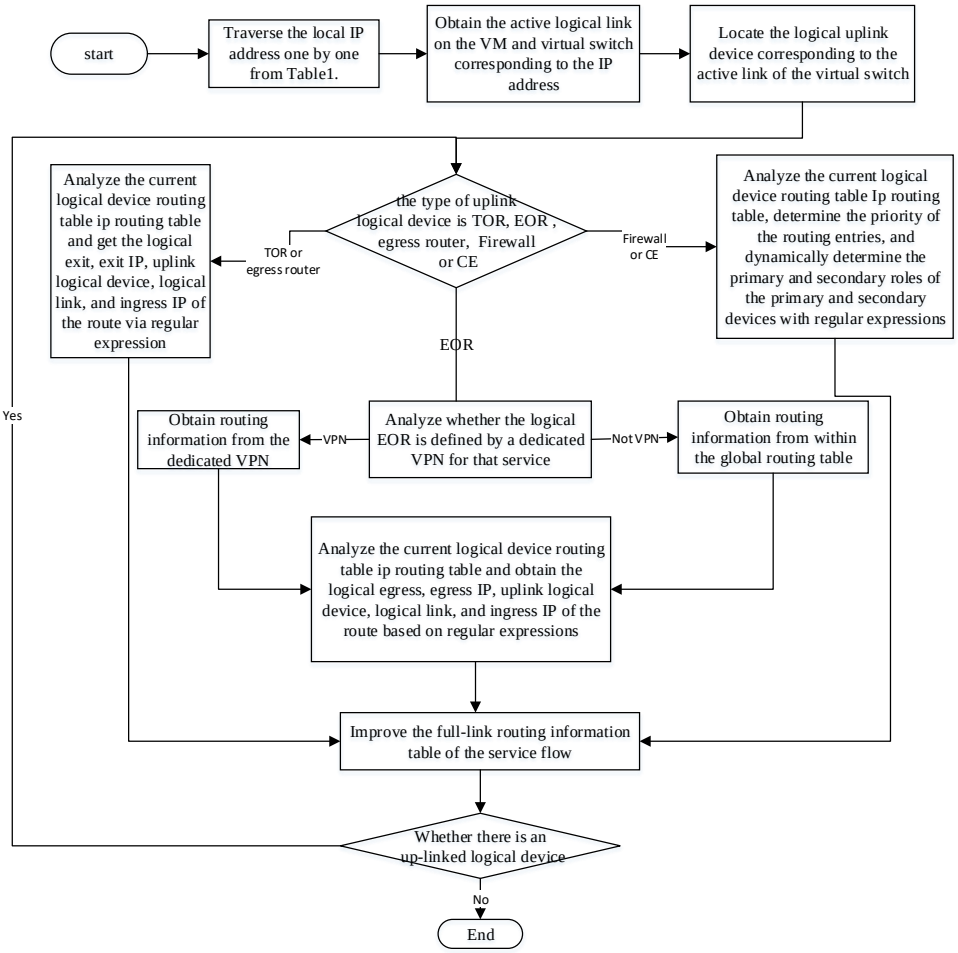

Figure 2. Business Traffic Full-Link Routing Path Analysis Method

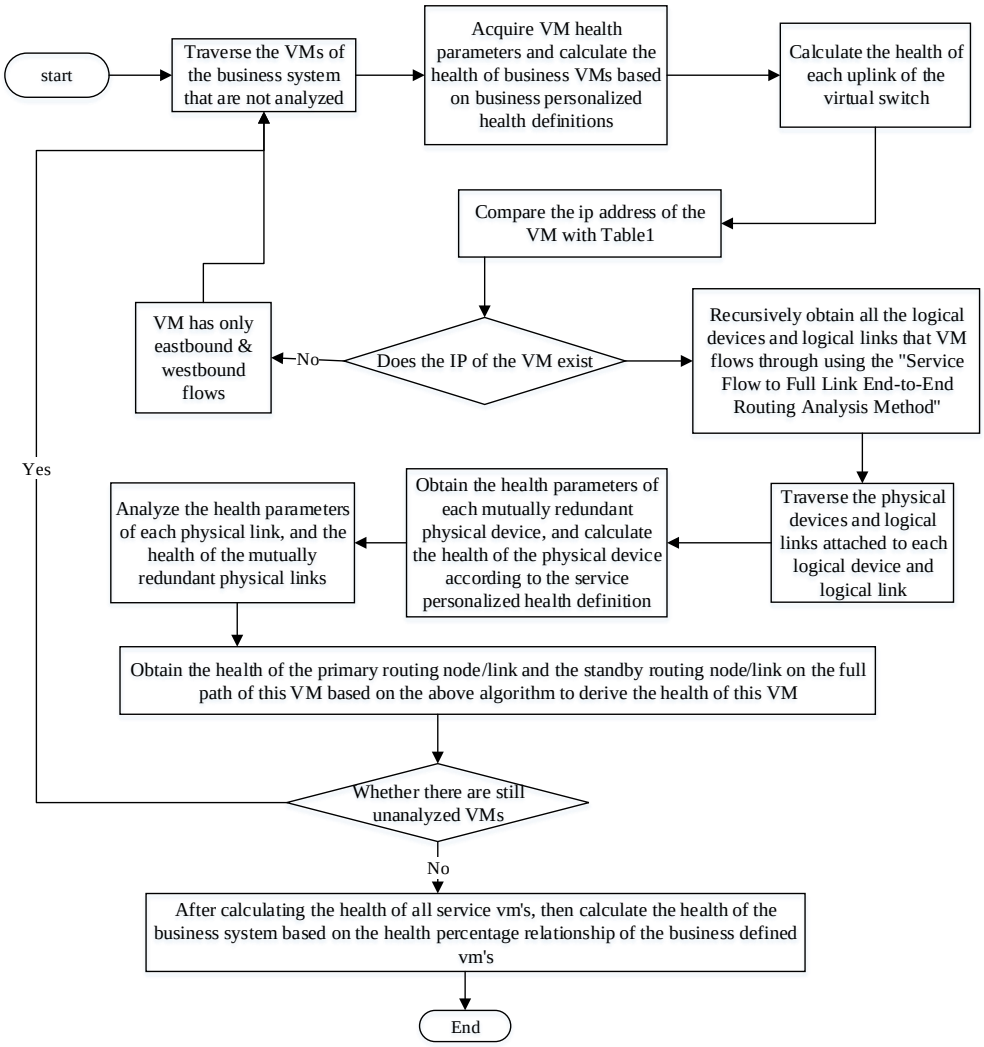

Figure 3: Analysis Method of Business Full Link Health

2.2 Analysis method of business full-link health

Although the device state at a certain time is the same, in the full-link health analysis of different businesses, the same state index has different importance for different businesses[8]. For example, the traffic of a port accounts for 40%, which is healthy for business system A and unhealthy for business system B.

Business full-link health analysis starts from the business VM itself, analyzes business flow through each node, links health, and incorporates them into the overall business health analysis.

According to the description of "II. Business Traffic Full-Link Routing Path Analysis Method", each device and link passing through each VM of the business system are calculated

dynamically[9]. Combined with the monitoring status index of the equipment, the health status of the whole link of business is calculated in turn.

- All VMs of the business system can be obtained, the virtualization interface can be used to obtain the state of each business VM, CPU, memory, disk, traffic and other resource utilization, and the health of the business VM can be calculated according to the definition of business personalized health indicators.

- We obtain the host and VLAN information where the business VM is located, get the virtual switch on which the business VM depends, judge the health status of each uplink of the virtual switch, and calculate the health status of the business VM at this node according to the health indicators defined by the business system.

- We obtain all logic devices and logical links flowing through the VM with the "Business Traffic Full-Link Routing Path Analysis Method.

- The full-link health of the VM can be calculated by integrating the link and device redundancy as well as each state index.

- According to the importance of VM carrying business, we determine the proportion of VM in the health analysis of the business system, and further, calculate the health of a business system.

3 CONCLUSIONS

From the production reality, all the links involved in the business on the cloud platform are analyzed and modeled. The model is very important to maintain the stable operation of the cloud platform. After a fault occurs in the cloud platform, based on the model, it can quickly determine the business impact range and automatically locate the fault point, which provides strong support for rapid troubleshooting[10].

3.1 Judgment on the scope of influence of cloud platform fault on business

Common failures of a cloud platform include server failure, network and security device failure, and device port failure.

Overall judgment: According to the established end-to-end link association, starting from the fault point, a recursive algorithm can be used to find the downlink device and port, until we get the VM running on the host and find the VM corresponding to the business system.

- Judgment on the scope of the business impact of port failure: According to the warning information, we obtain the failure point and the specific physical port of the switch; recursively associating all the affected hosts, the VMs running is obtained on the host, and these businesses are the affected businesses.

- Judgment on the scope of influence of network and safety device fault business: it is allowed to obtain the fault point from the warning information, obtain the list of devices offline devices, and obtain all the associated persistent hosts and the VMs running on the persistent hosts in a recursive manner. These businesses are the affected businesses.

- The virtualization interface is used to directly capture all VMs running on the physical server in case of server failure. After this failure occurs, all VMs on the host will have a HA, and VMs will automatically restart on other healthy hosts but need to notify the business system leader for business internal inspection.

3.2 Automatic positioning of fault points

Headings, or heads, are organizational devices that guide the reader through your paper. There are two types: component heads and text heads.

- The cloud platform defines business/customer importance. If some critical business/customer network traffic jams occur, it is necessary to comprehensively review the full link of the business, and judge and limit the unimportant business sharing links with the business. If the network is blocked due to excessive traffic, it needs to limit the traffic of the non-important business and increase the bandwidth of the important business traffic.

- If there are a large number of business complaints, the link association relationship is used to find the common links of these affected businesses, analyze the nodes on the common links, and quickly determine the fault points.

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