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NVIDIA NCP-AIN Exam Syllabus Topics:

Topic	Details
Topic 1	<ul style="list-style-type: none">• Spectrum-X Configuration, Optimization, Security, and Troubleshooting: This section of the exam measures the skills of Network Performance Engineers and covers configuring, managing, and securing NVIDIA Spectrum-X switches. It includes setting performance baselines, resolving performance issues, and using diagnostic tools such as CloudAI benchmark, NCCL, and NetQ. It also emphasizes leveraging DPUs for network acceleration and using monitoring tools like Grafana and SNMP for telemetry analysis.
Topic 2	<ul style="list-style-type: none">• AI Network Architecture: This section of the exam measures the skills of AI Infrastructure Architects and covers the ability to distinguish between AI factory and AI data center architectures. It includes understanding how Ethernet and InfiniBand differ in performance and application, and identifying the right storage options based on speed, scalability, and cost to fit AI networking needs.
Topic 3	<ul style="list-style-type: none">• InfiniBand Configuration, Optimization, Security, and Troubleshooting: This section of the exam measures the skills of Data Center Network Administrators and covers the configuration and operational maintenance of NVIDIA InfiniBand switches. It includes setting up InfiniBand fabrics for multi-tenant environments, managing subnet configurations, testing connectivity, and using UFM to troubleshoot and analyze issues. It also focuses on validating rail-optimized topologies for optimal network performance.

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NVIDIA-Certified Professional AI Networking Sample Questions (Q52-Q57):

NEW QUESTION # 52

How is congestion evaluated in an NVIDIA Spectrum-X system?

- A. By monitoring the CPU and power usage of network devices.
- B. By measuring the number of connected devices in the network.
- C. By analyzing the egress queue loads ensuring all ports are well-balanced.
- D. By assessing the physical distance between network devices.

Answer: C

Explanation:

In NVIDIA Spectrum-X, congestion is evaluated based on egress queue loads. Spectrum-4 switches assess the load on each egress queue and select the port with the minimal load for packet transmission. This approach ensures that all ports are well-balanced, optimizing network performance and minimizing congestion.

NEW QUESTION # 53

As the network administrator for a large-scale AI research cluster, you are responsible for ensuring seamless data flow across an InfiniBand east-west fabric that interconnects hundreds of compute nodes.

Which tool would you use to trace and discover the network paths between nodes on this InfiniBand east-west fabric?

- A. **ibnetdiscover**
- B. NetQ
- C. ibpathverify
- D. tracert

Answer: A

Explanation:

The **ibnetdiscover** utility is used to perform InfiniBand subnet discovery and outputs a human-readable topology file. GUIDs, node types, and port numbers are displayed, as well as port LIDs and node descriptions.

All nodes and links are displayed, providing a full topology. This utility can also be used to list the current connected nodes. The output is printed to the standard output unless a topology file is specified.

InfiniBand is a high-performance, low-latency interconnect technology used in AI and HPC data centers, particularly for east-west traffic between compute nodes in large-scale fabrics. Ensuring seamless data flow requires tools to troubleshoot and monitor the network, including the ability to trace and discover network paths between nodes. The question asks for the specific tool used to trace and discover paths in an InfiniBand fabric, which is a key task in InfiniBand troubleshooting.

According to NVIDIA's official InfiniBand documentation, the **ibnetdiscover** tool is designed to discover and map the topology of an InfiniBand fabric, including the paths between nodes. It scans the fabric, queries the subnet manager, and generates a topology map that details the connections between switches, Host Channel Adapters (HCAs), and other devices. This tool is essential for verifying connectivity, identifying routing paths, and troubleshooting issues like misconfigured routes or link failures in large-scale InfiniBand fabrics.

Exact Extract from NVIDIA Documentation:

"The **ibnetdiscover** tool is used to discover the InfiniBand fabric topology and generate a map of the network.

It queries the subnet manager to retrieve information about all nodes, switches, and links in the fabric, providing a detailed view of the paths between nodes. This tool is critical for troubleshooting connectivity issues and ensuring proper routing in InfiniBand networks."

-NVIDIA InfiniBand Networking Guide

This extract confirms that **ibnetdiscover** is the correct tool for discovering network paths in an InfiniBand east-west fabric. It provides a comprehensive view of the fabric's topology, enabling administrators to trace paths between compute nodes and ensure seamless data flow.

Reference: InfiniBand Fabric Utilities - NVIDIA Docs

NEW QUESTION # 54

Which component of the Spectrum-X platform is responsible for reordering out-of-order packets?

- A. Spectrum-4 switch
- **B. SuperNIC**
- C. NetQ
- D. DOCA software

Answer: B

Explanation:

Within the Spectrum-X platform, the NVIDIA BlueField-3 SuperNIC is responsible for reordering out-of-order packets. When RoCE adaptive routing is employed, packets may arrive at their destination out of order due to dynamic path selection. The BlueField-3 SuperNIC handles this by reassembling the packets in the correct order at the transport layer, ensuring that the application receives data seamlessly.

Reference Extracts from NVIDIA Documentation:

* "As different packets of the same flow travel through different paths of the network, they may arrive out of order to their destination. At the RoCE transport layer, the BlueField-3 DPU takes care of the out-of-order packets and forwards the data to the application in order."

* "The BlueField-3 SuperNIC offers adaptive routing, out-of-order packet handling and optimized congestion control." The NVIDIA Spectrum-X networking platform is an Ethernet-based solution optimized for AI workloads, combining Spectrum-4 switches, BlueField-3 SuperNICs, and software like DOCA and NetQ to deliver high performance, low latency, and efficient data transfer. A key feature of Spectrum-X is its adaptive routing, which dynamically selects the least-congested paths for packet transmission to maximize bandwidth and minimize latency. However, this per-packet load balancing can result in packets arriving out of order at the destination, necessitating a mechanism to reorder them for seamless application performance. The question asks which Spectrum-X component is responsible for reordering these out-of-order packets.

According to NVIDIA's official documentation, the BlueField-3 SuperNIC is the component responsible for reordering out-of-order packets in the Spectrum-X platform. The SuperNIC, a network accelerator designed for hyperscale AI workloads, handles packet reordering at the RDMA over Converged Ethernet (RoCE) transport layer. It uses its processing capabilities to transparently reorder packets and place them in the correct sequence in the host memory, ensuring that adaptive routing's out-of-order delivery is invisible to the application. This is critical for maintaining predictable performance in AI workloads, particularly for GPU-to-GPU communication in Spectrum-X networks.

Exact Extract from NVIDIA Documentation:

"The Spectrum-4 switches are responsible for selecting the least-congested port for data transmission on a per-packet basis. As different packets of the same flow travel through different paths of the network, they may arrive out of order to their destination. The BlueField-3 SuperNIC transforms any out-of-order data at the RoCE transport layer, transparently delivering in-order data to the application."

-NVIDIA Technical Blog: Turbocharging Generative AI Workloads with NVIDIA Spectrum-X Networking Platform This extract confirms that option A, the SuperNIC (specifically the BlueField-3 SuperNIC), is the correct answer. The SuperNIC's role in reordering packets ensures that the adaptive routing implemented by Spectrum-4 switches does not compromise application performance, maintaining high effective bandwidth and low tail latency for AI workloads.

NEW QUESTION # 55

In which mode of the BlueField DPU does the ARM system on the DPU control the NIC data path, but allow access to the DPU OS from the host?

- A. Separated Host mode
- B. NIC mode
- **C. DPU mode**
- D. Restricted mode

Answer: C

NEW QUESTION # 56

A user has requested confirmation that the InfiniBand network is performing optimally and is not limiting the speed of a training run. To verify this, you would like to measure the RDMA throughput rate between two endpoints.

Which tool should be used?

- **A. ib_write_bw**
- B. ibdiagnet

- Answer: A**

The `ib_write_bw` tool is part of the `PerfTest` package and is specifically designed to measure the bandwidth of RDMA write operations between two InfiniBand endpoints. It provides accurate assessments of RDMA throughput, which is crucial for verifying the performance of InfiniBand networks in high-performance computing and AI training environments.

NEW QUESTION # 57

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