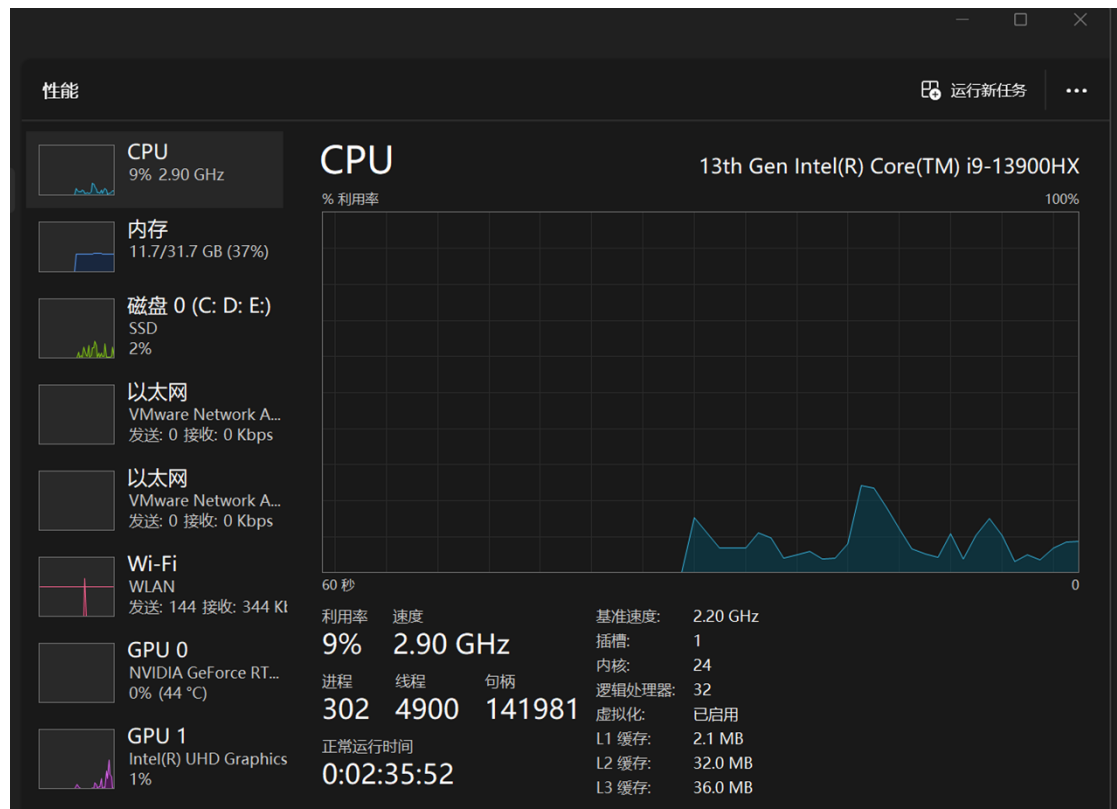**Answers to Lab 1 Questions**

Here are the answers to the technical questions for your reference and to include in your lab report.

1. Check and Enable Virtualization

- **How to Check (Windows):** Open Task Manager (Ctrl+Shift+Esc), go to the "Performance" tab, and look for "Virtualization" at the bottom-right. It will say "Enabled" or "Disabled".

2. The Cloud: Reasons for Success, Pros, and Cons

- **Fundamental Reasons for Success:**
    1. **Economic Efficiency:** Shifts IT spending from large capital expenditures (CapEx) on physical hardware to flexible operational expenditures (OpEx), "pay-as-you-go."
    2. **Scalability and Elasticity:** Businesses can instantly scale resources up or down to match demand, which is impossible with physical infrastructure.
    3. **Ease of Access and Global Reach:** Services and data are accessible from anywhere with an internet connection, enabling remote work and global deployment.
- **Three Pros:**
    1. **Cost Savings:** No need to purchase, maintain, or power physical servers.
    2. **Speed and Agility:** Developers can deploy new applications and resources in minutes.
    3. **Reliability and Disaster Recovery:** Data is backed up across redundant sites, making data loss and downtime much less likely.
- **Three Cons:**

1. **Potential for Unexpected Costs:** Poor resource management can lead to a high bill ("bill shock").
2. **Security and Compliance Concerns:** Entrusting sensitive data to a third party requires strong trust and contractual agreements.
3. **Vendor Lock-in:** It can be difficult and expensive to migrate services and data from one cloud provider (e.g., AWS) to another (e.g., Azure).

3. Primary function of a hypervisor

The primary function of a hypervisor (or Virtual Machine Monitor - VMM) is to create, run, and manage virtual machines (VMs). It acts as a layer of software that abstracts the physical hardware, allowing multiple guest operating systems to share a single physical host system's resources.

4. What is a virtual machine (VM)?

A Virtual Machine (VM) is a software-based emulation of a physical computer. It runs its own operating system and applications as if it were a physical machine, but it shares the underlying hardware resources of the host machine, managed by a hypervisor.

5. Benefits of using virtual machines

- **Server Consolidation:** Run multiple VMs on one physical server, improving hardware utilization.
- **Isolation:** Applications and OSes in different VMs are isolated from each other, improving security and stability.
- **Portability:** VMs can be easily moved between different physical hosts.
- **Disaster Recovery:** VMs can be backed up and restored easily.
- **Development and Testing:** Developers can test software in isolated environments without affecting their main machine.

6. Five use cases of virtual machines

1. **Running legacy software** that requires an older operating system.
2. **Creating isolated sandbox environments** for testing new software or malware analysis.
3. **Consolidating servers** in a data center to save on hardware and energy costs.
4. **Deploying applications** in a consistent and reproducible environment across development, testing, and production.
5. **Providing virtual desktops** to employees, allowing them to access their work environment from any device.

7. In virtualization, what is the guest operating system?

b) The operating system installed on a virtual machine

8. What does virtual machine isolation mean?

c) Virtual machines run independently and are isolated from each other and the host system.

9. What is the benefit of virtual machine portability?

c) It allows virtual machines to be moved between different physical machines with compatible hypervisors.

10. What is the purpose of cloning a virtual machine?

The purpose of cloning a virtual machine is to quickly create an identical copy. This is extremely useful for:

- Rapidly deploying multiple identical systems (e.g., for a cluster of web servers).
- Creating a perfect backup snapshot before making risky changes.
- Reproducing a specific environment for development or troubleshooting.