PDAL: The Foundation for Distributed Applications and Systems

Distributed Systems are the engine of our modern world. They describe the infrastructure of interconnected computers that work together to achieve a common goal. Every time you use an app like TikTok, stream a video on Netflix, or make a purchase on Amazon, you're interacting with such systems, which are composed of thousands of servers. Within these systems, **distributed applications** run, such as a microservices architecture. Understanding this infrastructure and the applications that run on it is one of the most sought-after skills in today's job market.

The Challenge of Practical Learning

To truly understand distributed systems, it's essential to build them yourself and develop applications for them. In traditional courses, this is often difficult, as working on real, production servers is too risky. At the same time, theoretical concepts often remain abstract without practical application. The PDAL (Personal Distributed Applications Lab) bridges this gap.

The PDAL: Your Personal Data Center

The PDAL is a safe, personal learning environment for building **distributed systems** and developing **distributed applications**. It allows you to set up your own small data center, completely isolated from your main computer. Here, you can experiment, make mistakes, and learn from them without risk. You'll be guided through creating and networking virtual environments (LXC containers) and installing middleware services like web servers and databases. Building on this foundation, you will then implement your own **distributed applications**.

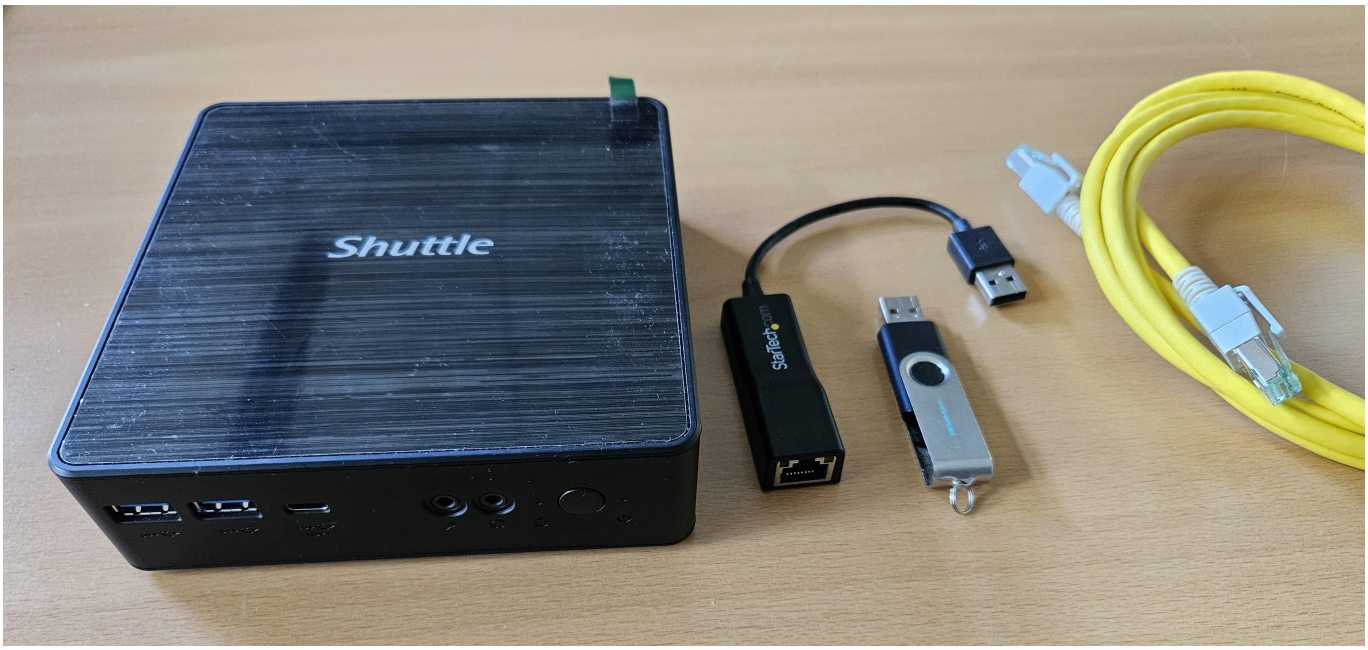
What the PDAL Offers and What It Doesn't

The PDAL is **not a complete system administration degree** and doesn't require any specific prior knowledge. It serves as your first guided entry into the world of **distributed systems** and **applications**. The focus is on teaching you the fundamentals in a way that allows for quick successes and maintains your motivation. This learning path not only teaches you how to perform individual steps but also the skill of independent problem-solving. At the end of this journey, you will have built a solid foundation for your own continued learning in this field.

Necessary Prerequisites

To get started, you will need a few things:

- **Your Own Computer:** A Windows PC that will serve as the host.
- **USB Flash Drive (min. 8 GB):** Needed to install the Proxmox VE hypervisor.
- **USB Network Adapter:** To isolate the PDAL from your home network.
- **Practice Computer:** A dedicated machine (e.g., an older laptop or a mini PC) that will be used exclusively for the PDAL.



Learning Goals of the PDAL

By the end of this learning path, you will have acquired the following skills:

- **Infrastructure Fundamentals:** You will be able to set up a host machine with a bare-metal hypervisor (Proxmox VE) and manage virtual environments (LXC containers).
- **Operating System and Container Management** This block is dedicated to the ability to create and configure Ubuntu LTS LXC containers and perform basic Linux tasks within the containers.
- **Practical Application:** You will be able to install and configure various middleware systems like Apache, MariaDB, JupyterLab, Grafana, and MQTT brokers.
- **Distributed Applications:** You will be able to design and implement a simple distributed application (microservices), understanding how the individual components interact.

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