What is Docker? And Why?

Docker is a container technology: A tool for creating and managing containers

Container

A standardized unit of software

A package of code **and** dependencies to run that code (e.g. NodeJS code + the NodeJS runtime)

The same container always yields the **exact same application and execution behavior**! No matter where or by whom it might be executed.

Support for Containers **is built into** modern operating systems!

Docker simplifies the creation and management of such containers

Let’s Take A Step Back

Dishes

Food

A Picnic Basket

Let’s Take A Step Back

A Picnic Basket

It’s portable

It contains food and dishes

You can share it and use it everywhere

No special environment or tools are required

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Why Containers?

Why would we want independent, standardized “application packages”?

Different Development & Production Environments

We want to build and test in exactly (!) the same environment as we later run our app in

Different Development Environments Within a Team / Company

Every team member should have the exactly (!) same environment when working on the same project

Clashing Tools / Versions Between Different Projects

When switching between projects, tools used in project A should not clash with tools used in project B

The Problems

Environment: The runtimes, languages, frameworks you need for development

Development Environment ⟷ Production Environment

often not the same

Development Environment for Employee A ⟷ Development Environment for Employee B

often not the same

Tools & Libraries required for Project A ⟷ Tools & Libraries required for Project B

often not the same

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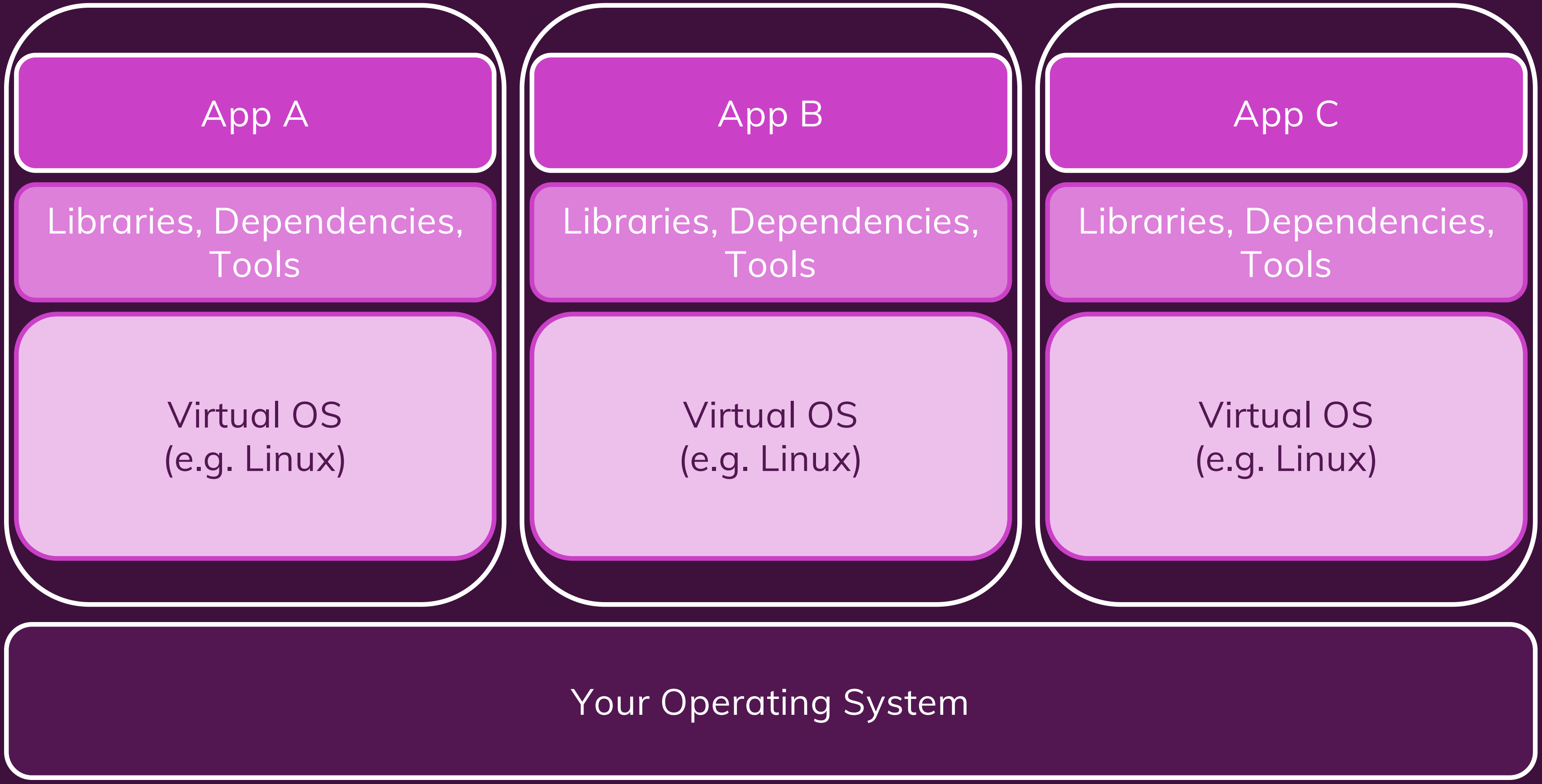
We Want Reliability & Reproducible Environments

✓ We want to have the **exact same environment for development and production** ➔ This ensures that it works exactly as tested

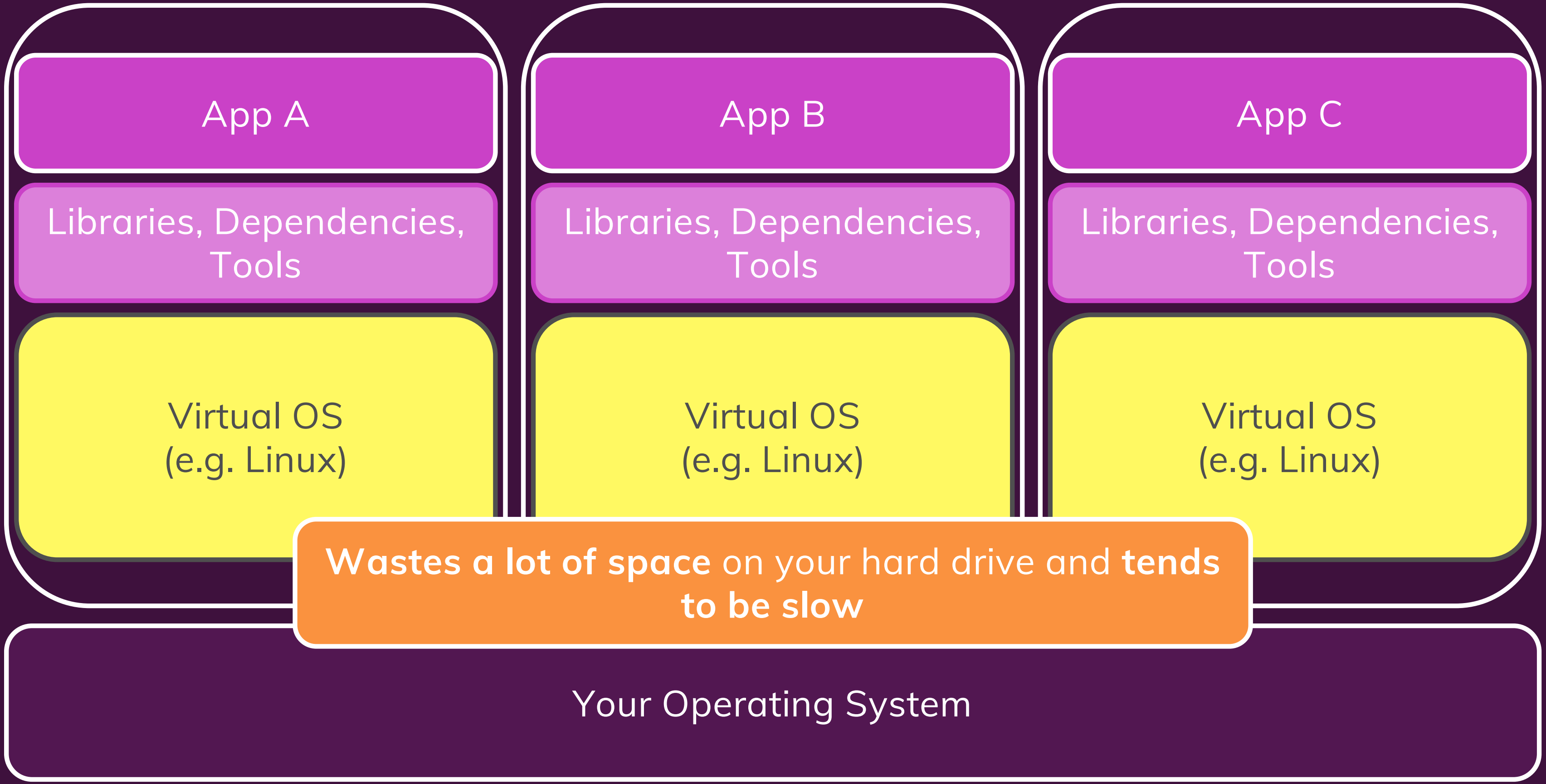
✓ It should be easy to **share a common development environment**/ setup with (new) employees and colleagues

✓ We **don't want to uninstall and re-install** local dependencies and runtimes all the time

Solution: Virtual Machines / Virtual Operating Systems



Solution: Virtual Machines / Virtual Operating Systems

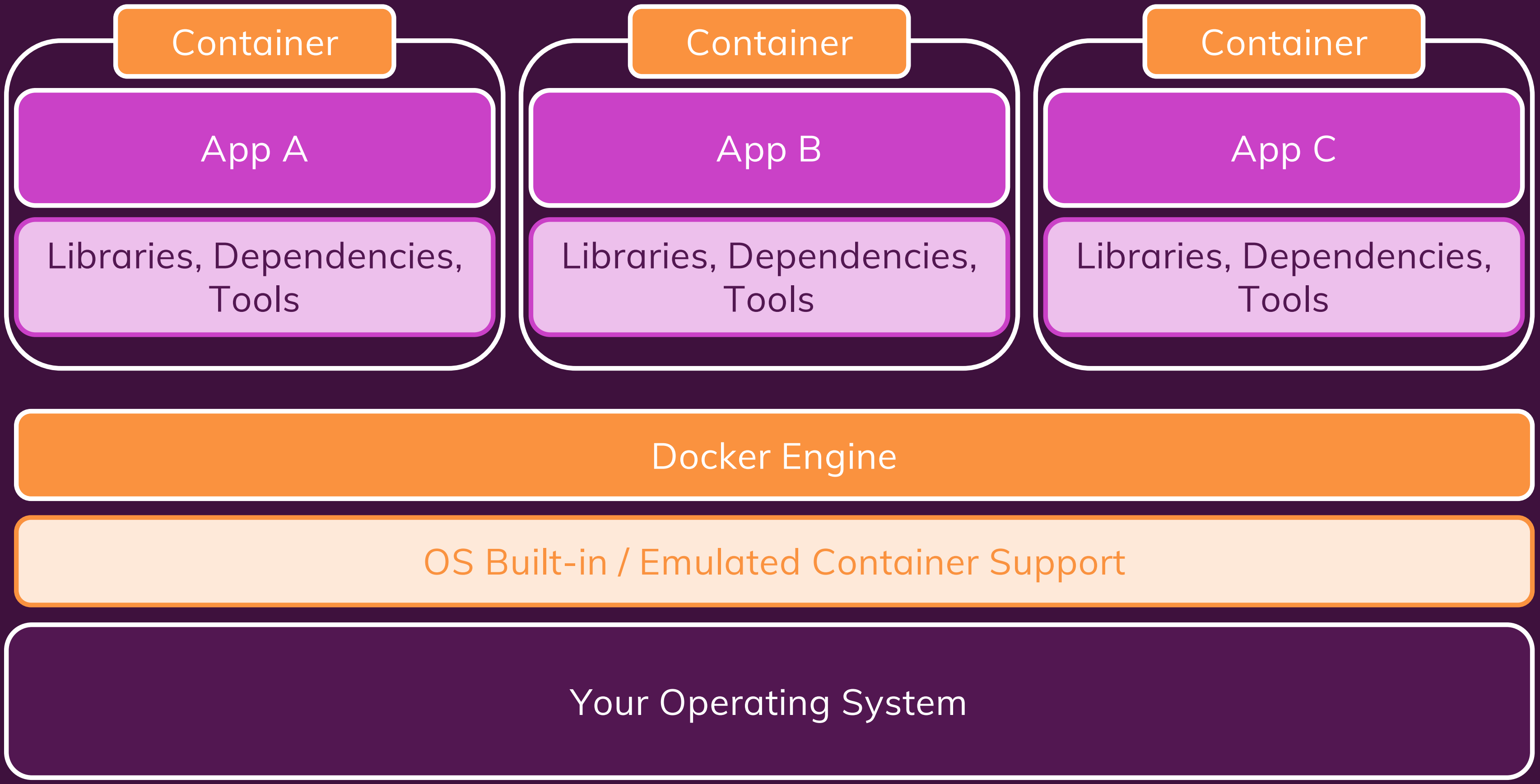


Wastes a lot of space on your hard drive and **tends to be slow**

Virtual Machines / Virtual OS: Summary

Pro	Con
Separated environments	Redundant duplication, waste of space
Environment-specific configurations are possible	Performance can be slow, boot times can be long
Environment configurations can be shared and reproduced reliably	Reproducing on another computer/ server is possible but may still be tricky

Docker Helps You Build & Manage "Containers"


Container
Container
Container
App A
App B
App C
Libraries, Dependencies, Tools
Libraries, Dependencies, Tools
Libraries, Dependencies, Tools
Docker Engine
OS Built-in / Emulated Container Support
Your Operating System

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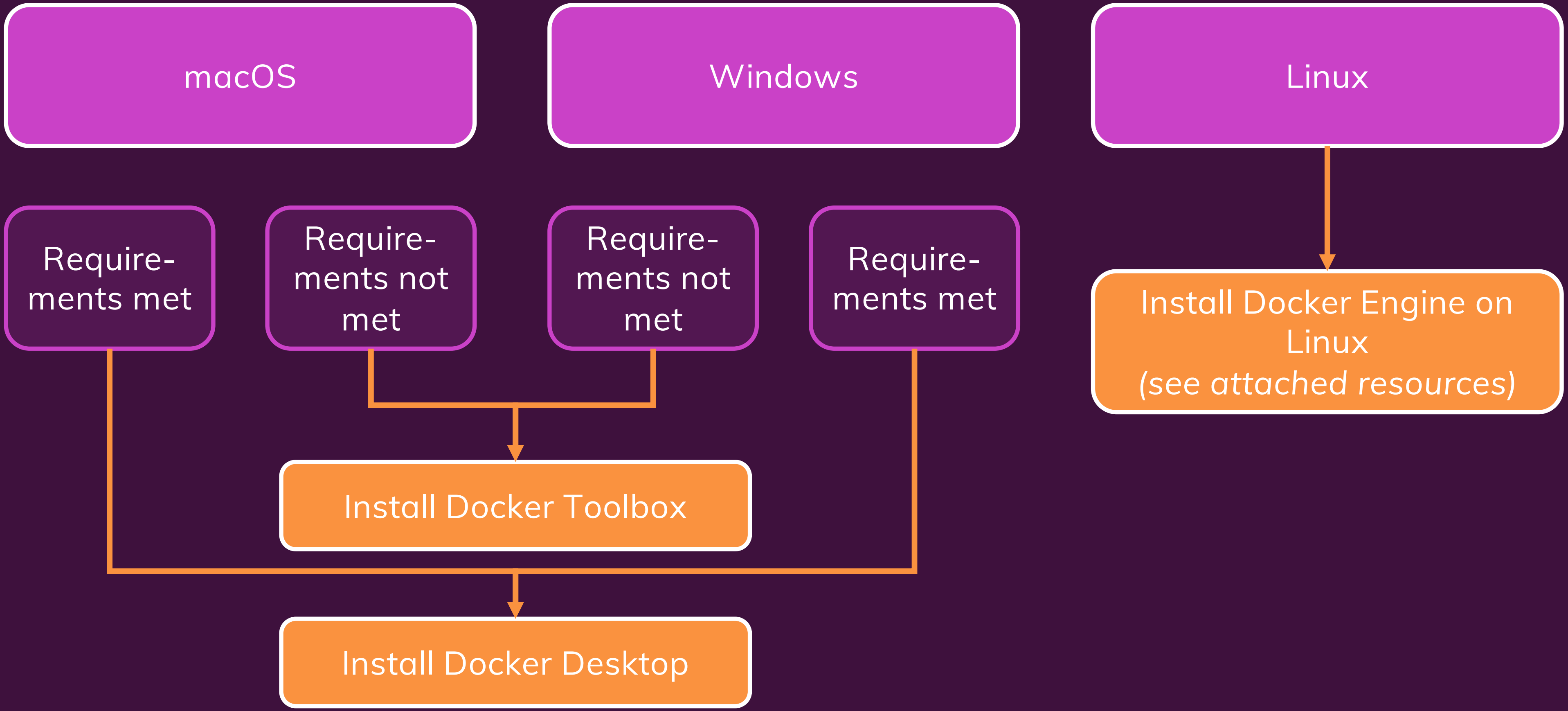
Containers vs Virtual Machines

Docker Containers	Virtual Machines
Low impact on OS, very fast, minimal disk space usage	Bigger impact on OS, slower, higher disk space usage
Sharing, re-building and distribution is easy	Sharing, re-building and distribution can be challenging
Encapsulate apps/ environments instead of “whole machines”	Encapsulate “whole machines” instead of just apps/ environments

Docker Setup



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Docker Tools & Building Blocks

Docker Engine

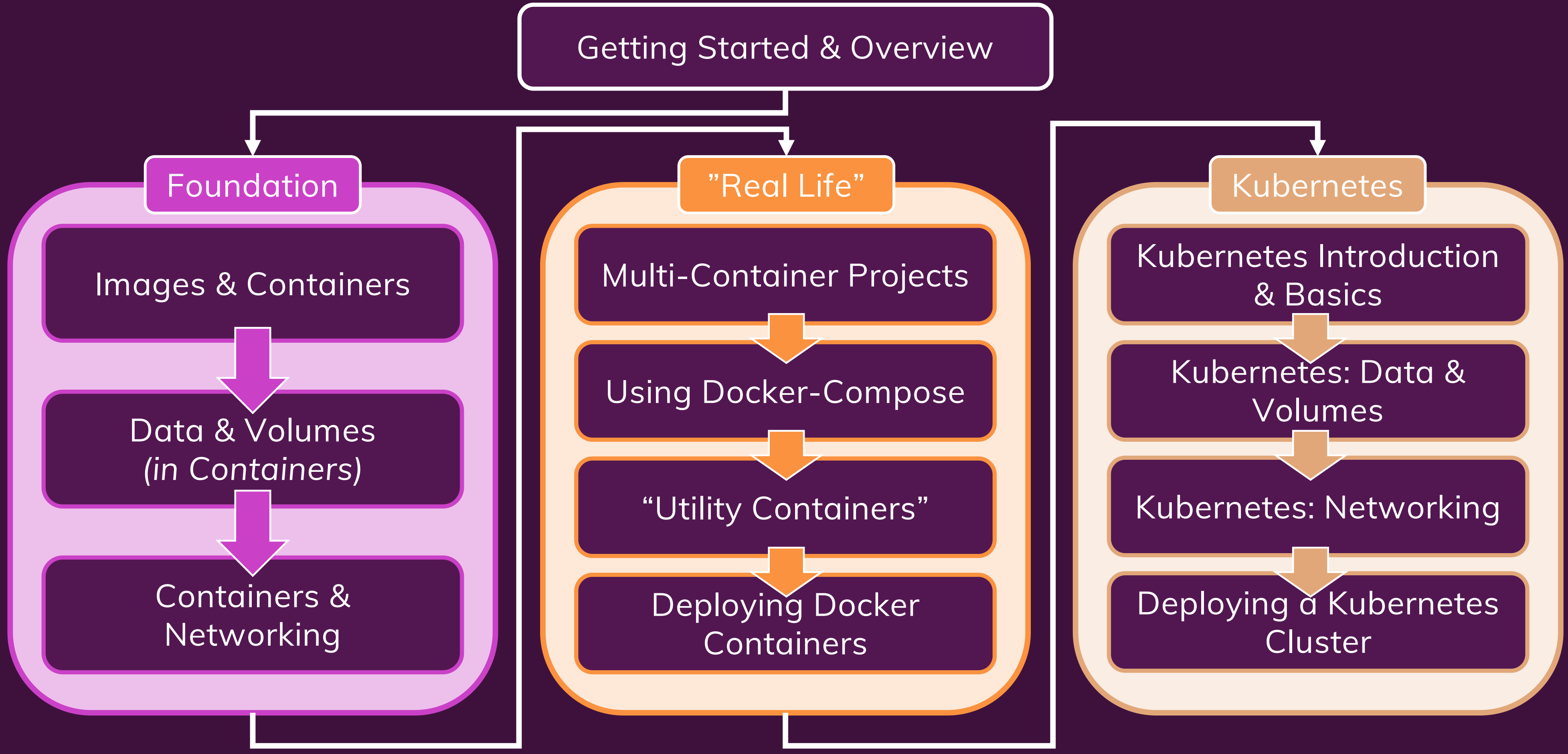
Docker Desktop (incl. Daemon & CLI)

Docker Hub

Docker Compose

Kubernetes

Course Outline


Getting Started & Overview
Foundation
Images & Containers
Data & Volumes (in Containers)
Containers & Networking
"Real Life"
Multi-Container Projects
Using Docker-Compose
"Utility Containers"
Deploying Docker Containers
Kubernetes
Kubernetes Introduction & Basics
Kubernetes: Data & Volumes
Kubernetes: Networking
Deploying a Kubernetes Cluster

Getting The Most Out Of This Course

Watch the Videos	At your pace – use the video player controls
Code along	Pause videos, code along, code ahead
Repeat Concepts	Repeat videos or sections if unclear
Google, Stackoverflow	Search the web in case of errors
Ask & Answer in Q&A Section	Ask and help others in the Q&A board