

Layered Architectures: Introduction

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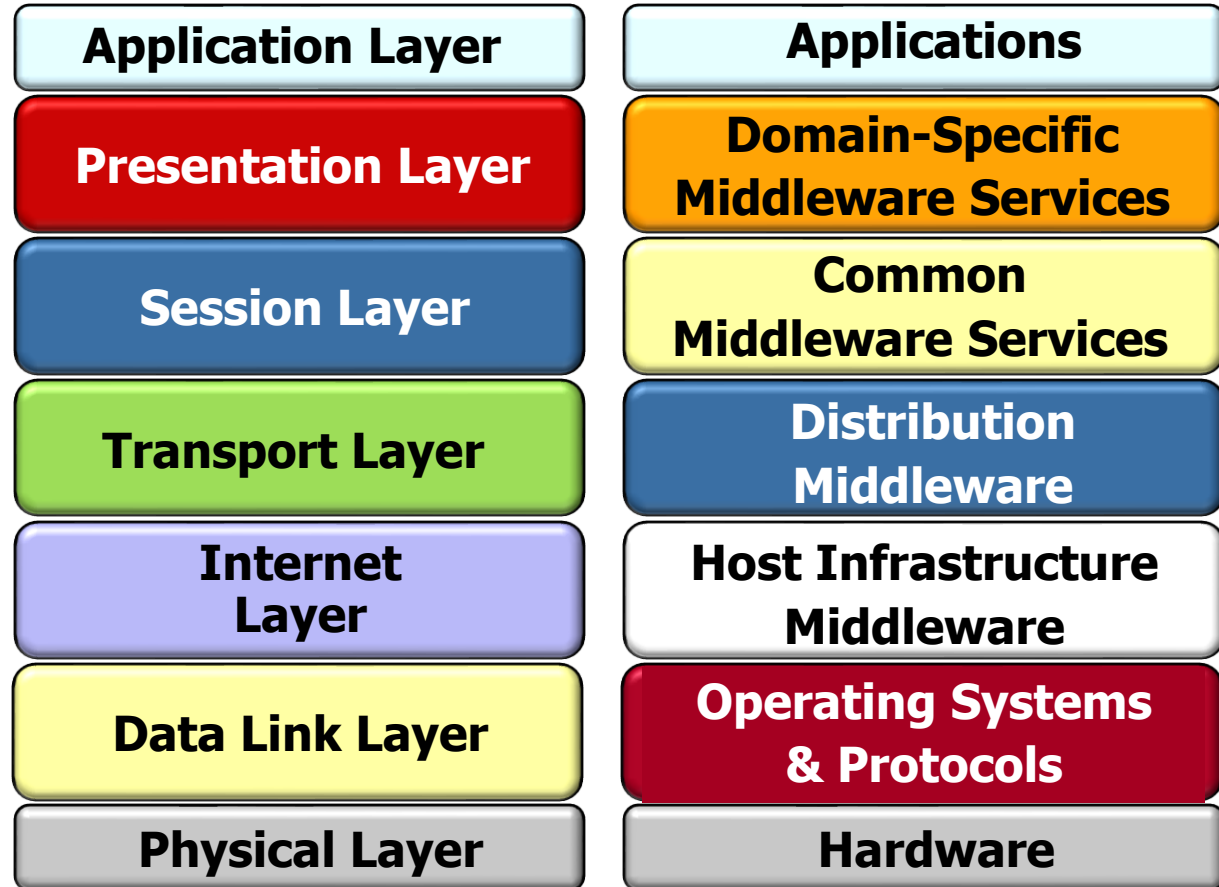
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**Vanderbilt University
Nashville, Tennessee, USA**



Learning Objectives in this Part of the Lesson

- Know what layered architectures are



Overview of Layered Architectures

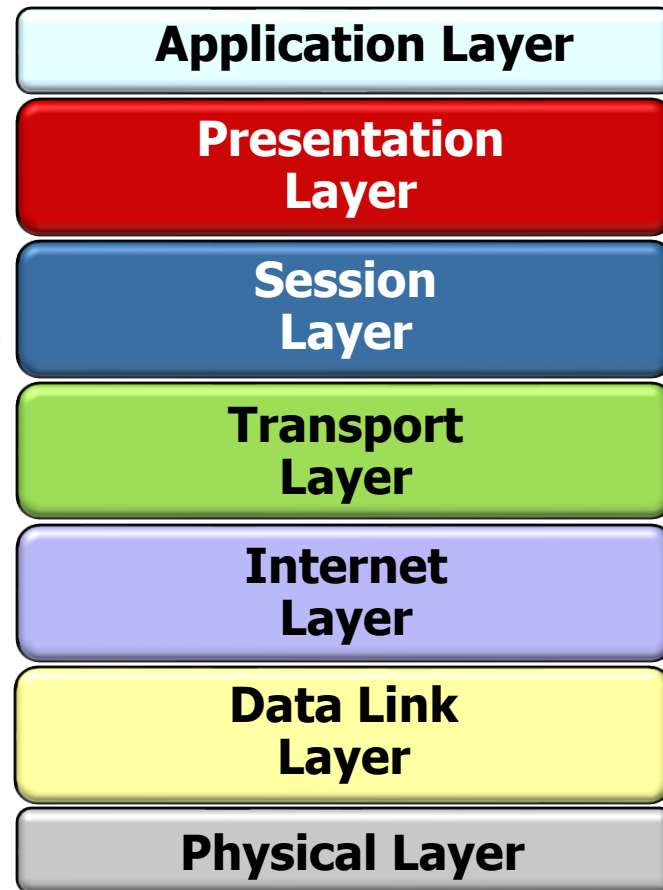
An Overview of Layered Architectures

- Layering is applied in many domains



An Overview of Layered Architectures

- Layering is applied in many domains, e.g.
 - Computer networking protocol stacks

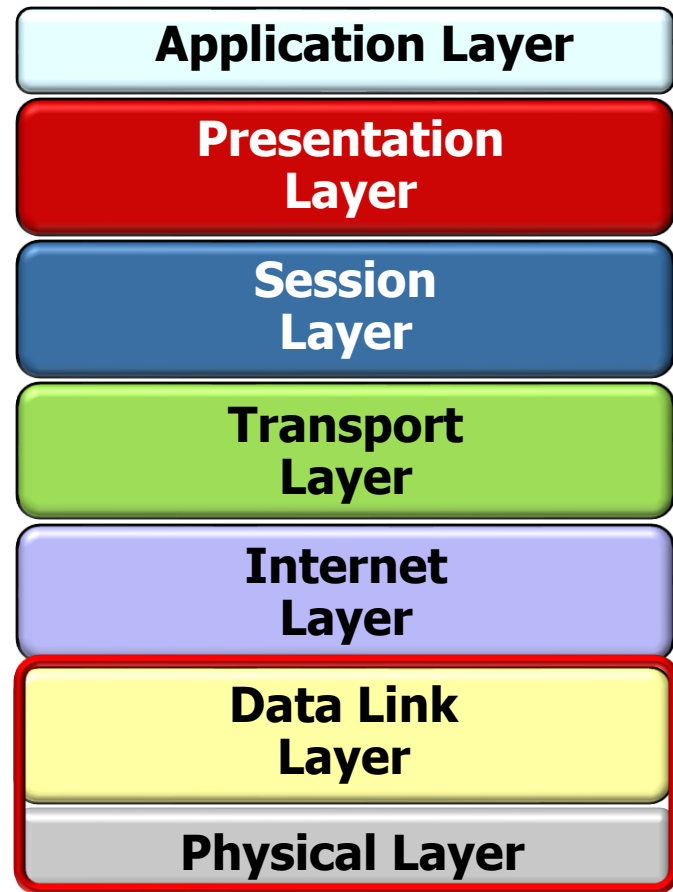


Enables end-to-end communication by specifying how data should be (un)packetized, addressed, transmitted, routed, & received

See en.wikipedia.org/wiki/Protocol_stack

An Overview of Layered Architectures

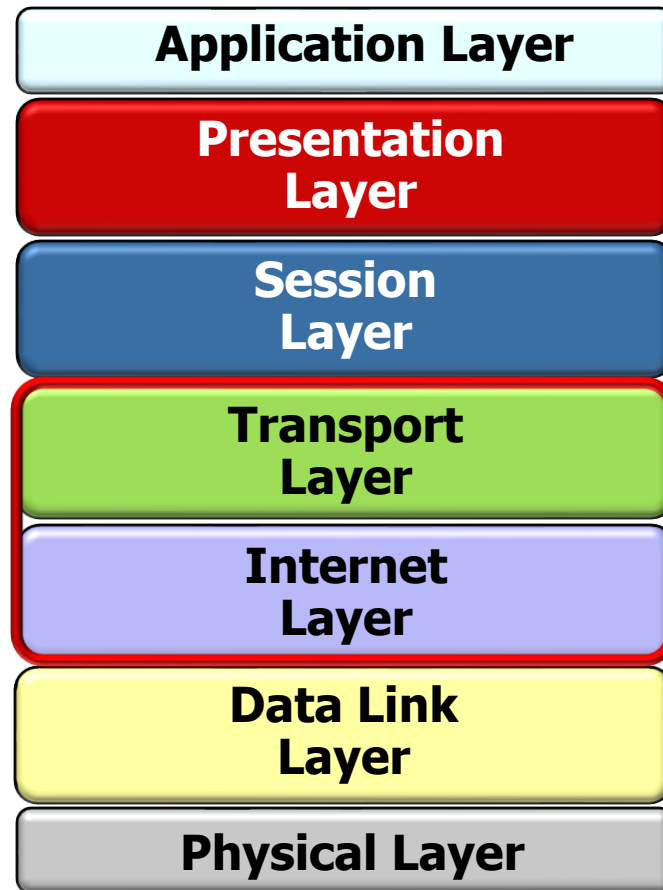
- Layering is applied in many domains, e.g.
 - Computer networking protocol stacks
 - Lower layers handle interactions with the hardware
 - e.g., GSM, DSL, & Ethernet



See en.wikipedia.org/wiki/Link_layer & en.wikipedia.org/wiki/Physical_layer

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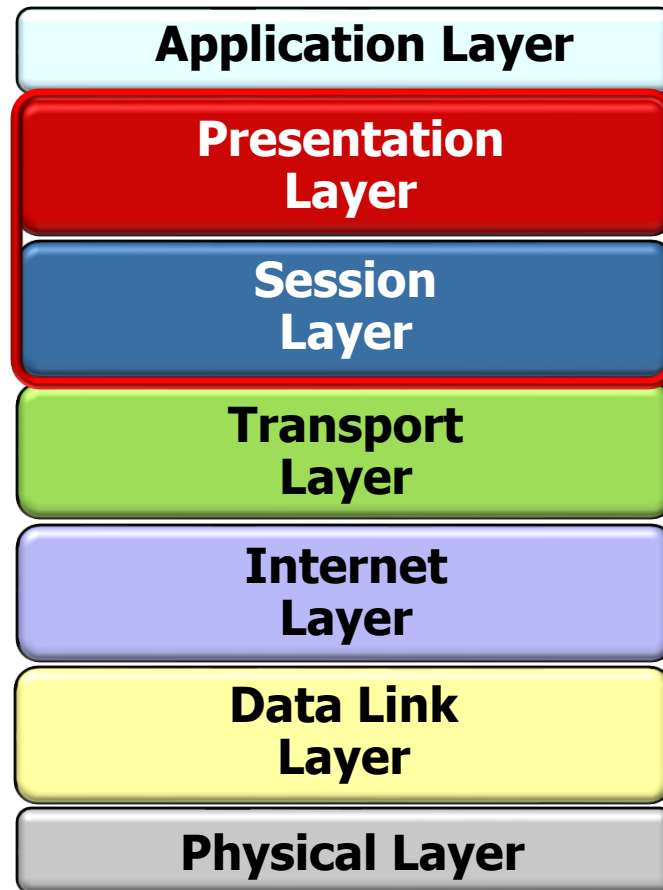
- Layering is applied in many domains, e.g.
 - Computer networking protocol stacks
 - Lower layers handle interactions with the hardware
 - Middle layers exchange packets across hosts & routers
 - e.g., IP, TCP, & UDP



See en.wikipedia.org/wiki/Internet_layer & en.wikipedia.org/wiki/Transport_layer

An Overview of Layered Architectures

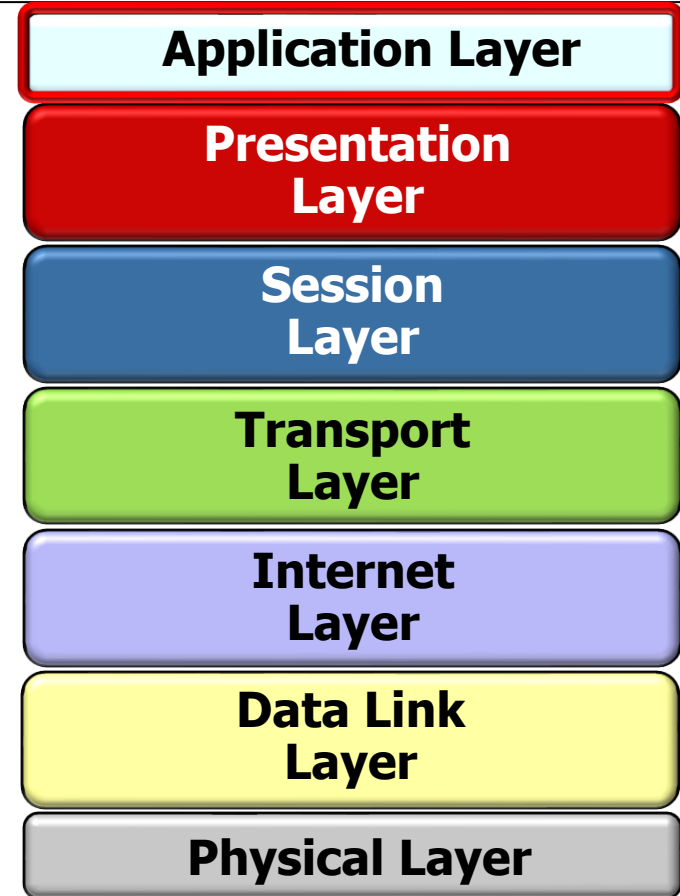
- Layering is applied in many domains, e.g.
 - Computer networking protocol stacks
 - Lower layers handle interactions with the hardware
 - Middle layers exchange packets across hosts & routers
 - Upper layers implement & interact with applications
 - e.g., PPTP, XDR, CDR, JSON



See en.wikipedia.org/wiki/Session_layer & en.wikipedia.org/wiki/Presentation_layer

An Overview of Layered Architectures

- Layering is applied in many domains, e.g.
 - Computer networking protocol stacks
 - Lower layers handle interactions with the hardware
 - Middle layers exchange packets across hosts & routers
 - Upper layers implement & interact with applications
 - Applications (& middleware) mostly just deal with the upper layer(s)
 - e.g., FTP, TELNET, SMTP, & SNMP

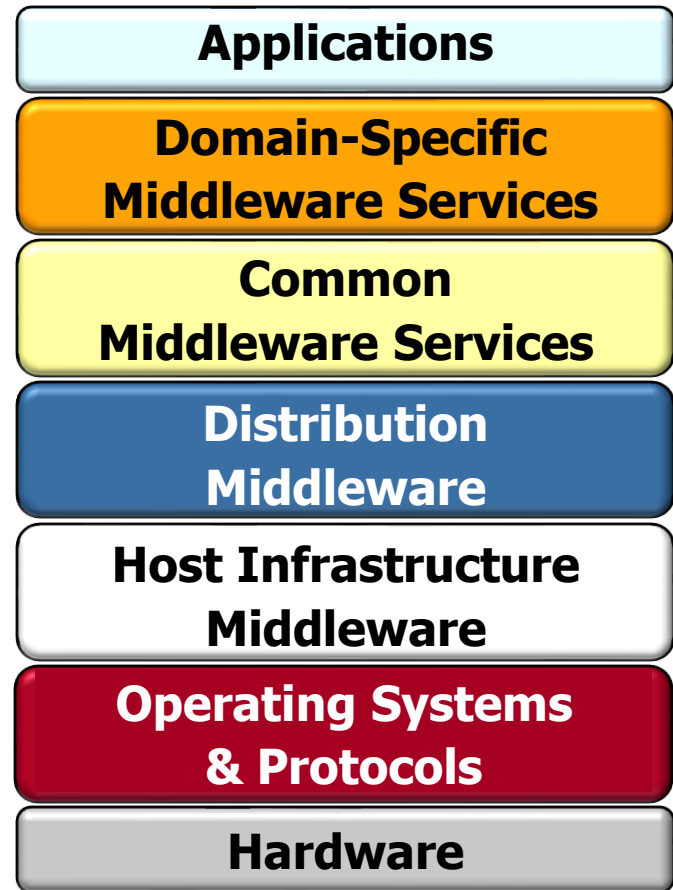


See en.wikipedia.org/wiki/Application_layer

An Overview of Layered Architectures

- Layering is applied in many domains, e.g.
 - Computer networking protocol stacks
 - Communication middleware in multi-tier enterprise IT systems

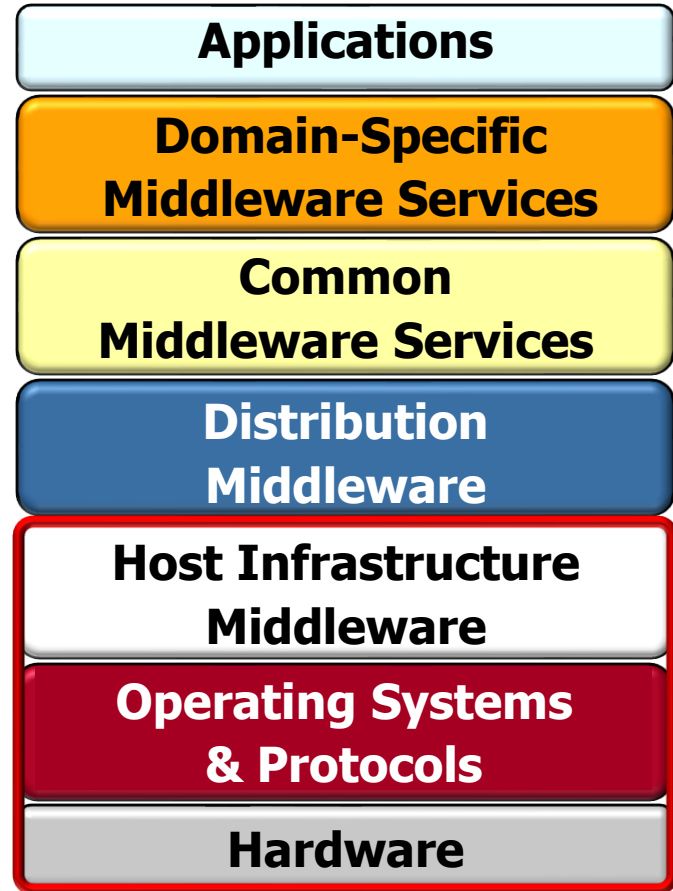
Provides services beyond the OS & protocol stacks to enable components in a distributed system to communicate & manage data



See [en.wikipedia.org/wiki/Middleware \(distributed applications\)](https://en.wikipedia.org/wiki/Middleware_(distributed_applications))

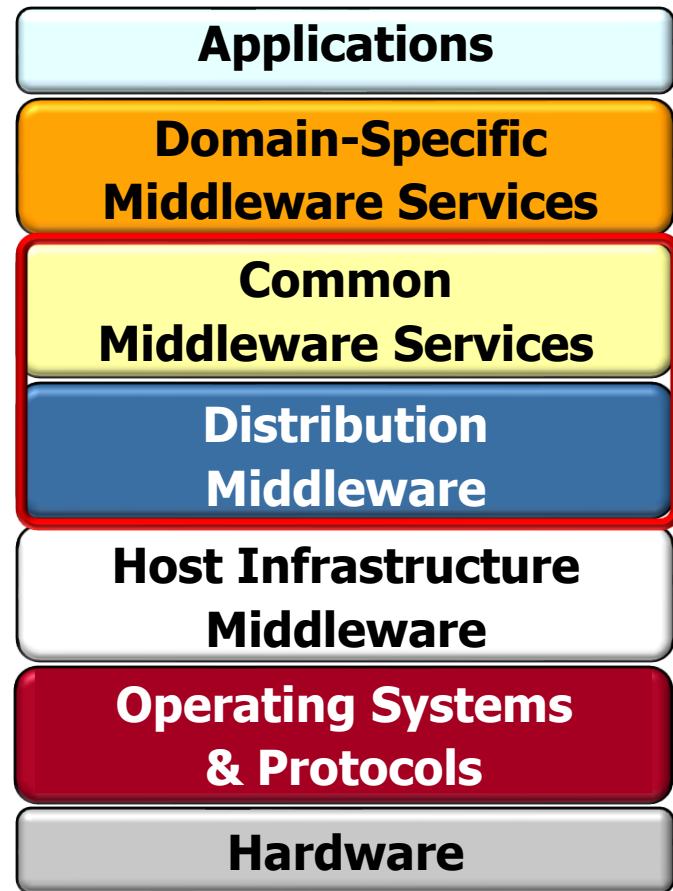
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- Layering is applied in many domains, e.g.
 - Computer networking protocol stacks
 - Communication middleware in multi-tier enterprise IT systems
 - Lower layers provide portable APIs for accessing hardware & system resources
 - e.g., Linux, Windows, JVM, & ACE



An Overview of Layered Architectures

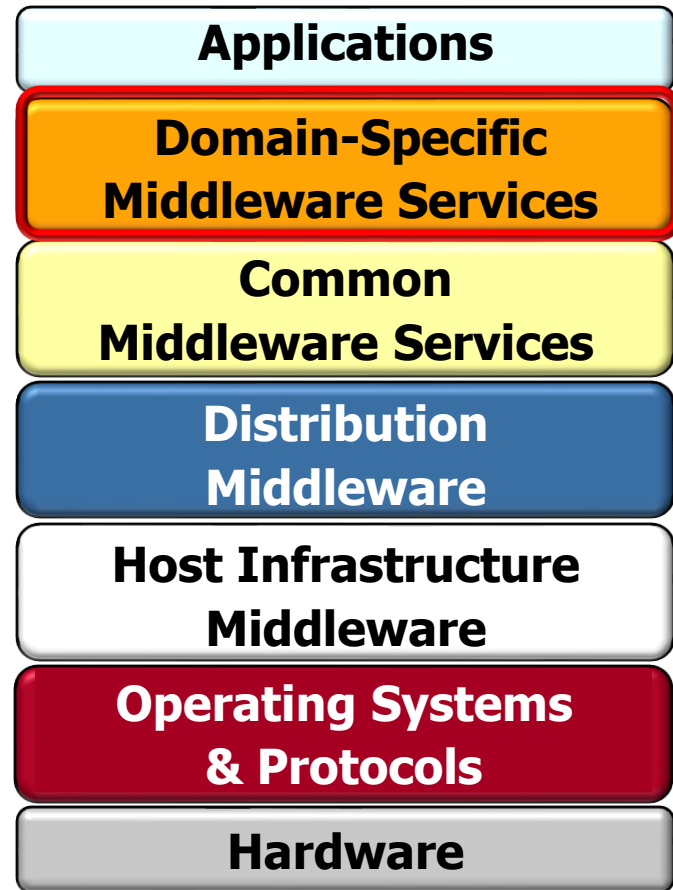
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 - Lower layers provide portable APIs for accessing hardware & system resources
 - Middle layers shield applications from network programming details
 - e.g., DDS, Web Services, MQTT, Spring, CORBA, etc.



See www.dre.vanderbilt.edu/~schmidt/PDF/middleware-encyclopedia.pdf

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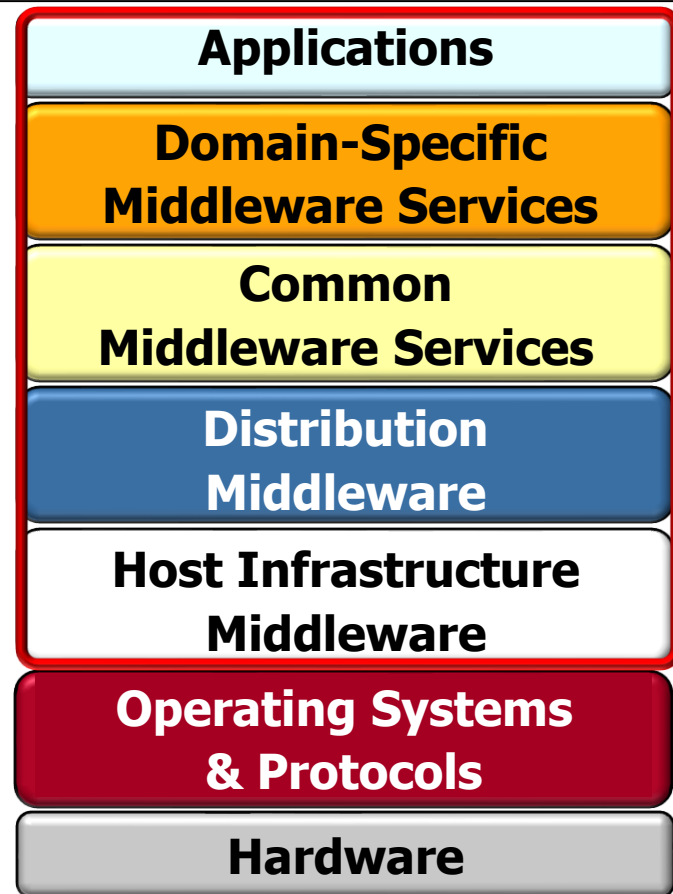
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 - Lower layers provide portable APIs for accessing hardware & system resources
 - Middle layers shield applications from network programming details
 - Upper layers enable domain-specific reuse of capabilities
 - e.g., MD-PnP, IIC, & FACE



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- Layering is applied in many domains, e.g.
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 - Lower layers provide portable APIs for accessing hardware & system resources
 - Middle layers shield applications from network programming details
 - Upper layers enable domain-specific reuse of capabilities
 - Applications may deal w/multiple layers



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End of Layered Architectures: Introduction