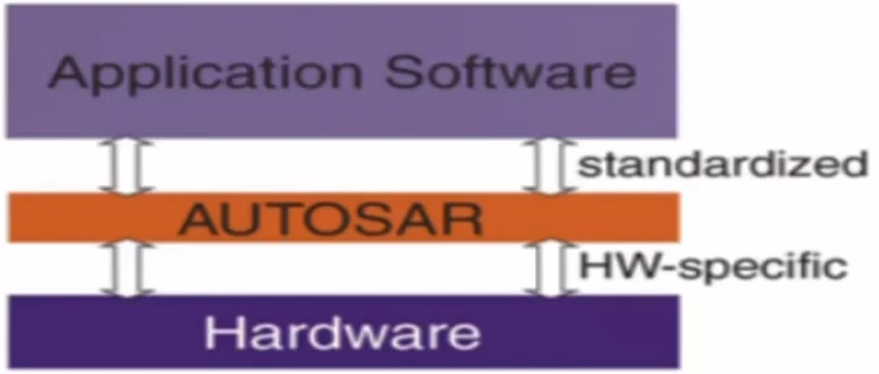
AUTOSAR LAYERS

WHY AUTOSAR

Hardware/Software Interface

- Software is highly hardware dependent
- Large efforts for relocating functions

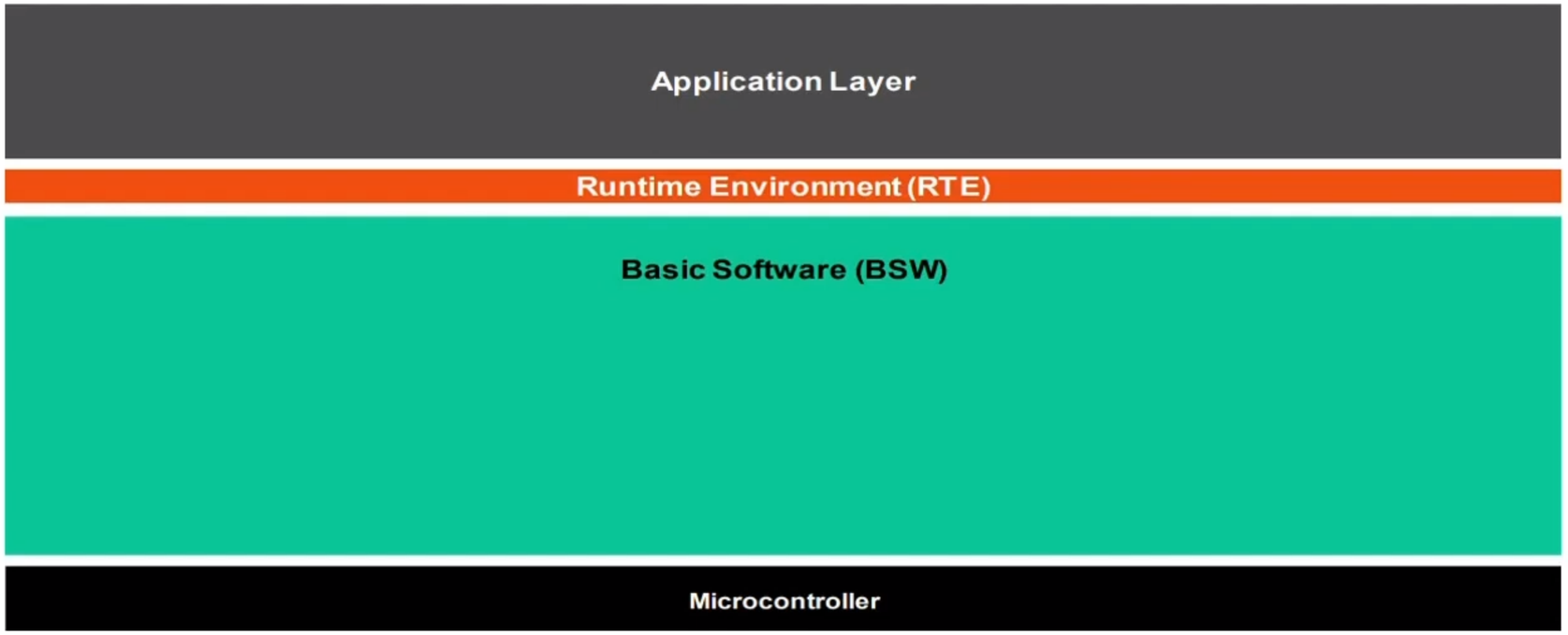


- Software is largely independent of the chosen microcontroller
- Simplified development process
- Reuse of software

OVERVIEW OF SOFTWARE LAYERS

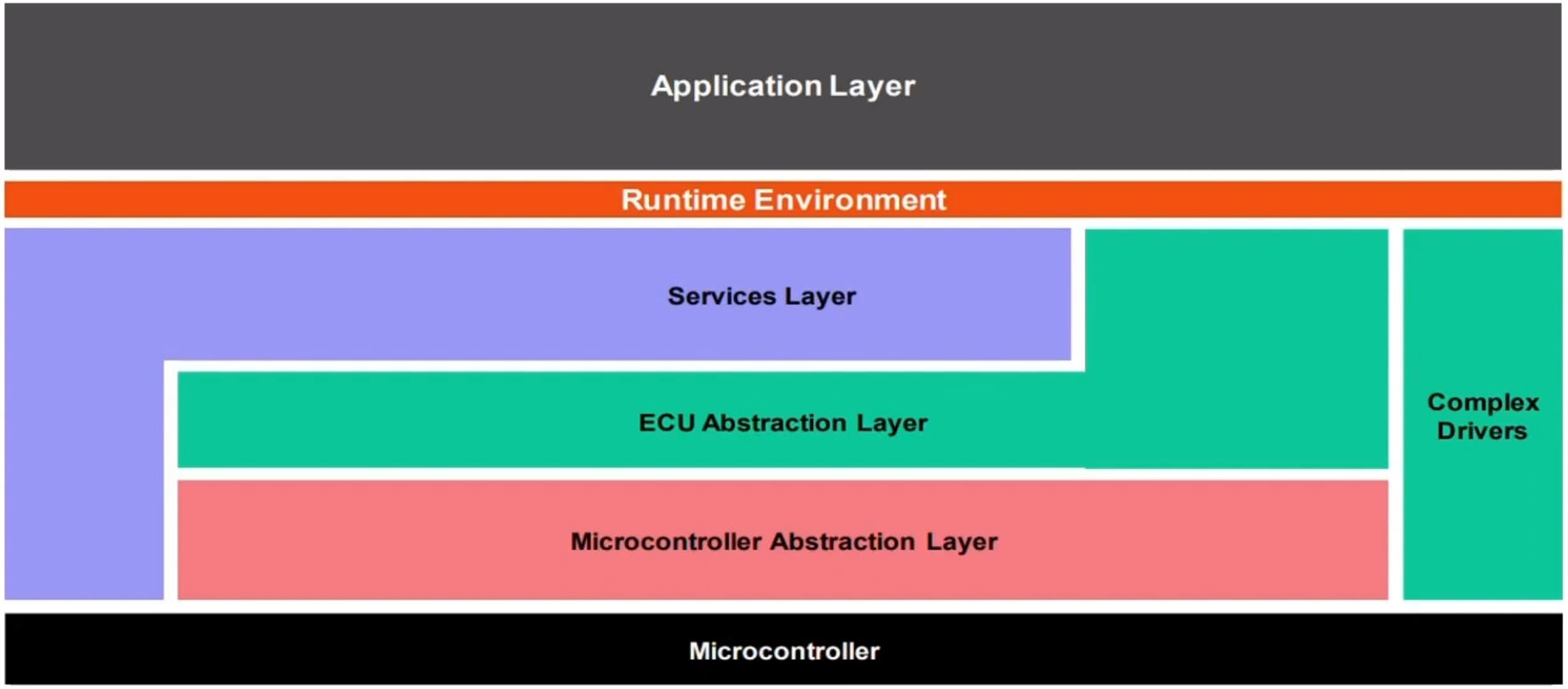
The Classic Autosar Platform divided into 3 main layers

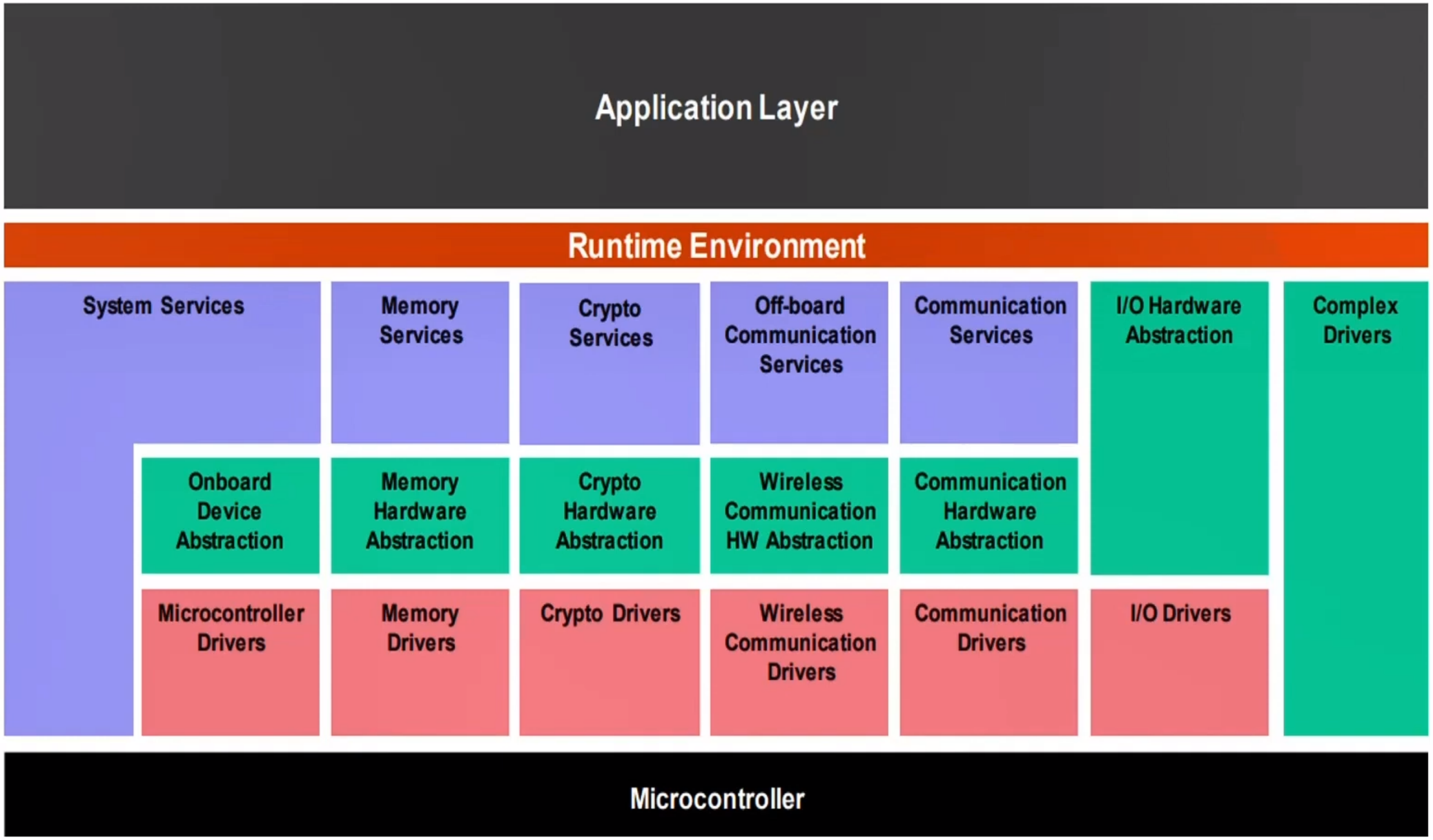
1. Base Software (It is common to any Autosar ECU)
2. RTE (Autosar Run Time Environment)
3. Application Layer

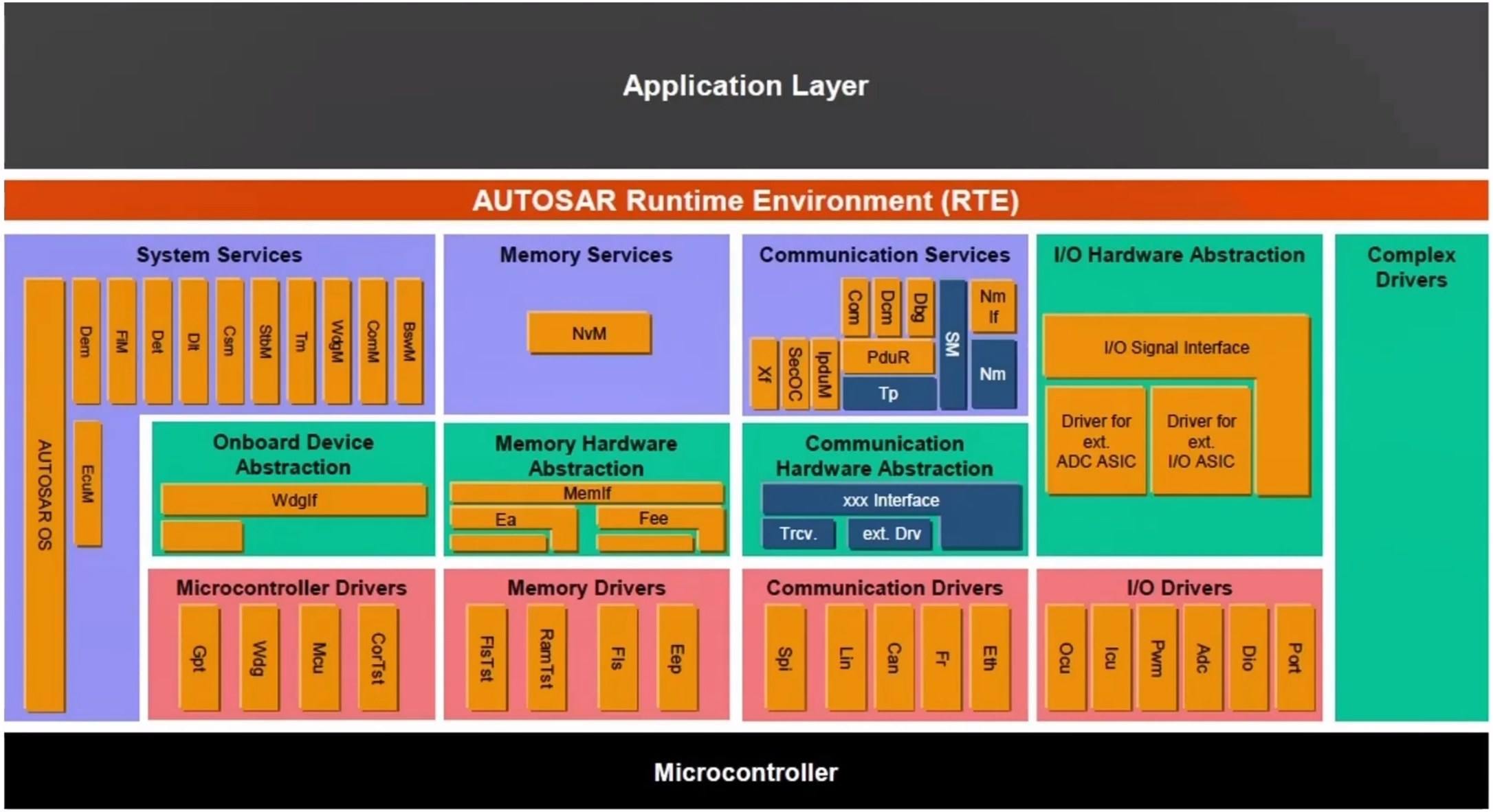


Autosar Basic Software is further divided in the Layers.

1. Service Layer
2. ECU Abstraction Layer
3. Microcontroller Abstraction Layer

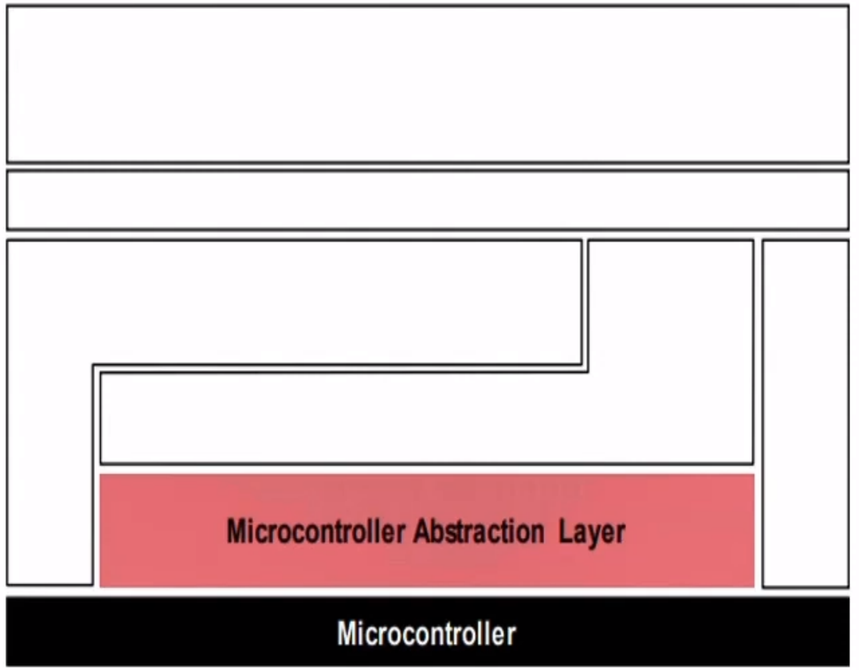


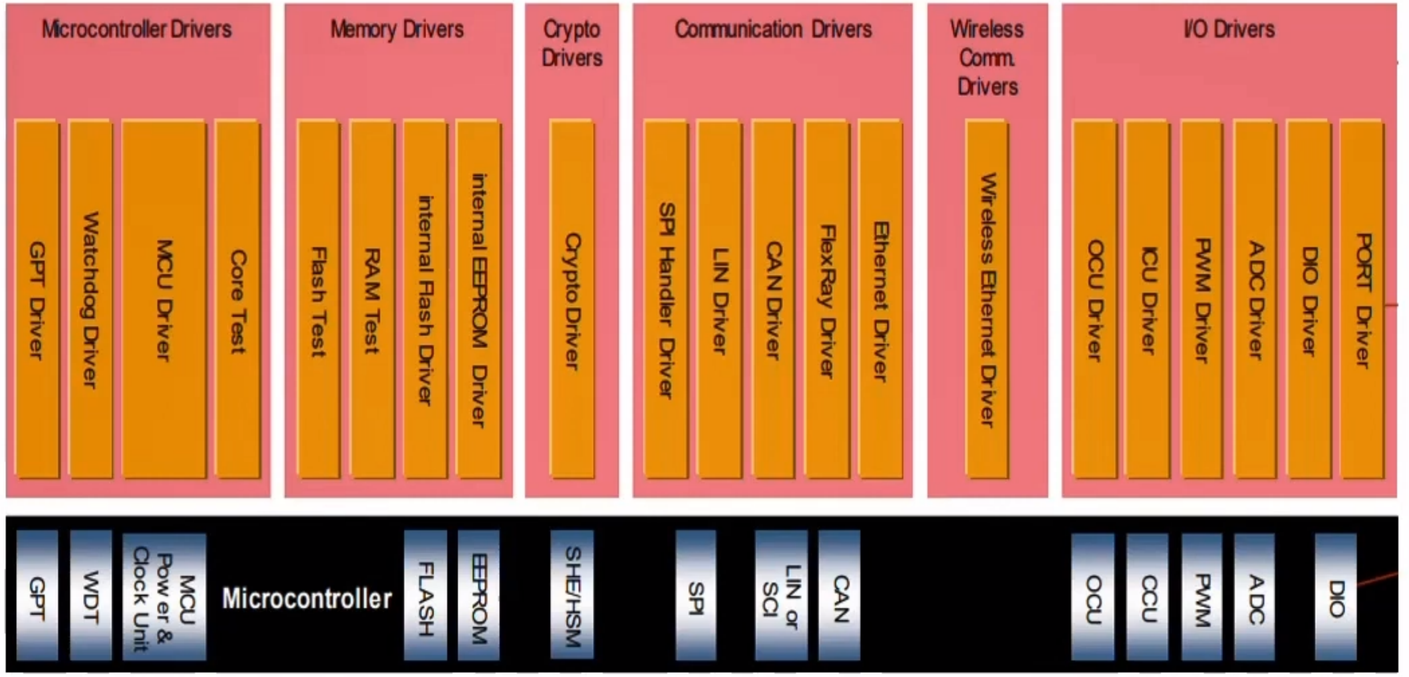

Application Layer
Runtime Environment
System Services
Memory Services
Crypto Services
Off-board Communication Services
Communication Services
I/O Hardware Abstraction
Complex Drivers
Onboard Device Abstraction
Memory Hardware Abstraction
Crypto Hardware Abstraction
Wireless Communication HW Abstraction
Communication Hardware Abstraction
Microcontroller Drivers
Memory Drivers
Crypto Drivers
Wireless Communication Drivers
Communication Drivers
I/O Drivers
Microcontroller


Application Layer
AUTOSAR Runtime Environment (RTE)
System Services
AUTOSAR OS
Dem
FiM
Det
Dlt
Csm
StbM
Tm
WdgM
ComM
BswM
EcuM
Memory Services
NvM
Communication Services
Com
Dcm
Dbg
SM
Nm If
Xf
SecOC
IpduM
PduR
Nm
Tp
I/O Hardware Abstraction
I/O Signal Interface
Driver for ext. ADC ASIC
Driver for ext. I/O ASIC
Complex Drivers
Onboard Device Abstraction
WdgIf
Memory Hardware Abstraction
MemIf
Ea
Fee
Communication Hardware Abstraction
xxx Interface
Trcv.
ext. Drv
Microcontroller Drivers
Gpt
Wdg
Mcu
CorTst
Memory Drivers
FlsTst
RamTst
Fls
Eep
Communication Drivers
Spi
Lin
Can
Fr
Eth
I/O Drivers
Ocu
Icu
Pwm
Adc
Dio
Port
Microcontroller

MICROCONTROLLER ABSTRACTION LAYER

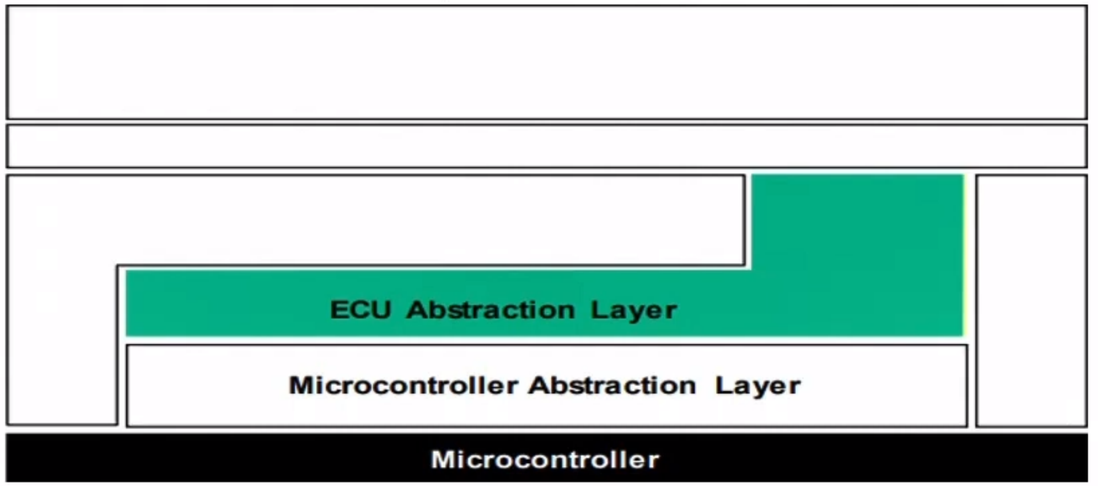
- MCAL is the Lowest software layer of the Basic Software .
- It contains internal drivers ,which are software modules with direct access to the microcontroller and internal peripherals.





ECU ABSTRACTION LAYER

- The ECU abstraction Layer interfaces the driver of the Micro Controller Abstraction Layer. It also Contains driver for external Devices.
- It offers an API for access to Peripherals and devices regardless of their location (Microcontroller Internal/external) and their connection to the microcontroller (port pins and type of interface)

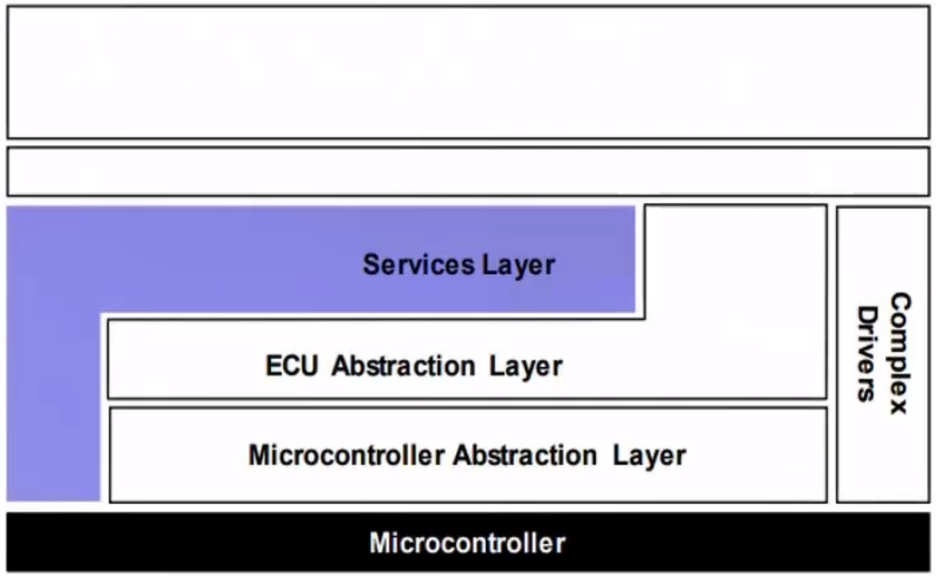


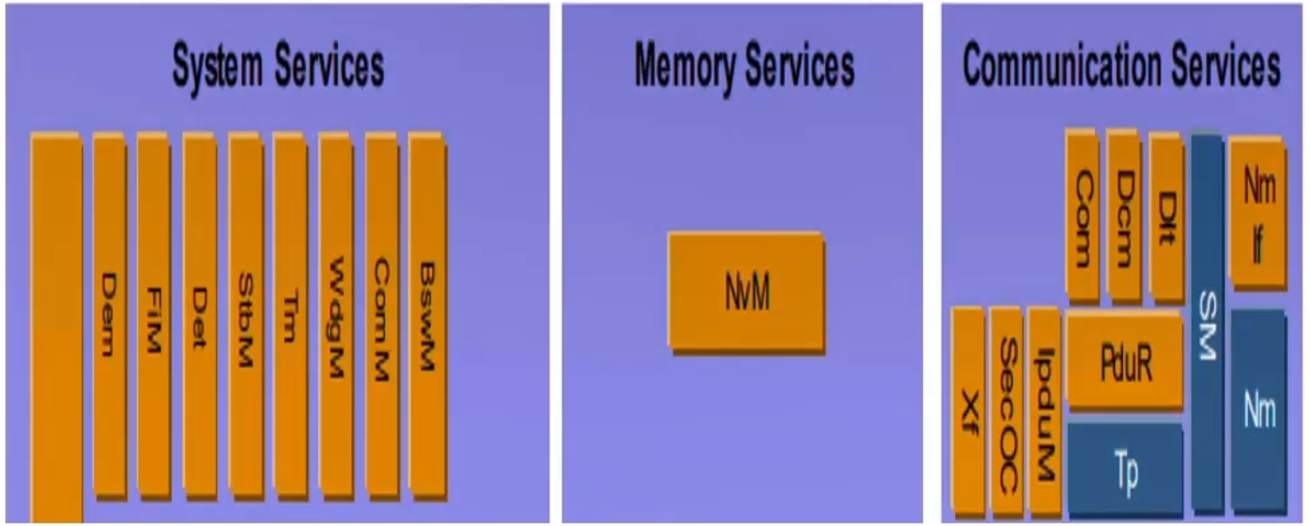
COMPLEX DEVICE DRIVER

- CDD is useful when we are creating a Non Standard functionality within BSW Stack.
- Functionality requires strict timing constraints which may be lesser than the minimum timing of AUTOSAR OS resolution then Complex Device Drivers module is useful.
- An example is to implement complex sensor evaluation and actuator control with direct access to the µC using specific interrupts and/or complex µC peripherals (like PCP, TPU), e.g.
    1. Injection control
    2. Electric valve control
    3. Incremental position detection
    4. XCP

SERVICE LAYER

- The Service Layer is the highest layer of the Basic Software.
- The main work of the service layer is to provide services from/to the application layer to/from the microcontroller.



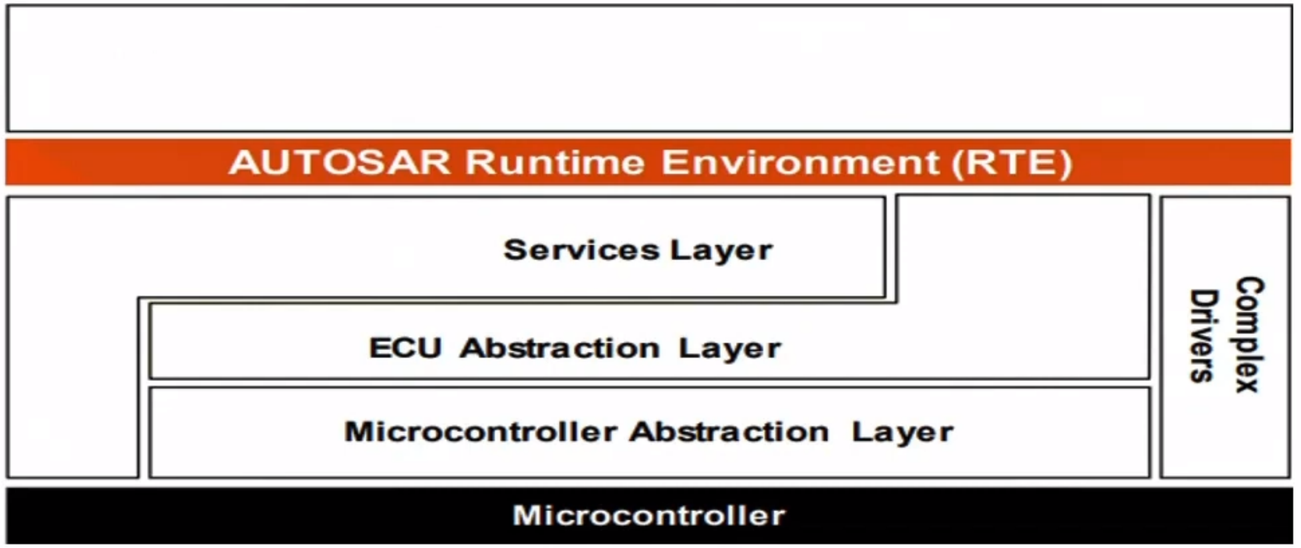


The Service Layer offers

- Operating system functionality
- Vehicle network communication and management services
- Memory services (NVRAM management)
- Diagnostic Services (including UDS communication, error memory and fault treatment)
- ECU state management, mode management
- Logical and temporal program flow monitoring (Wdg manager)

RUN TIME ENVIRONMENT

- The RTE is a layer providing communication services to the application software (AUTOSAR Software Components and/or AUTOSAR Sensor/Actuator components).
- The AUTOSAR Software Components communicate with other components (inter and/or intra ECU) and/or services via the RTE.
- Above the RTE the software architecture style changes from "layered" to "component style“.



APPLICATION LAYER

- The application layer is the first layer of the AUTOSAR software architecture and supports custom functionalities implementation. This layer consists of the specific software components and many applications which perform specific tasks as per instructions.
- For instance, dimming the light of the vehicle is something that the application layer handles.

TAKE AWAY

- Application Layer has Many Software Components
- BSW Layers : Service, ECU Abstraction, Microcontroller Abstraction and CDD
- RTE - RTE takes care of communication between different ECUs, within the same ECU, between the basic software layer and application layer, etc.