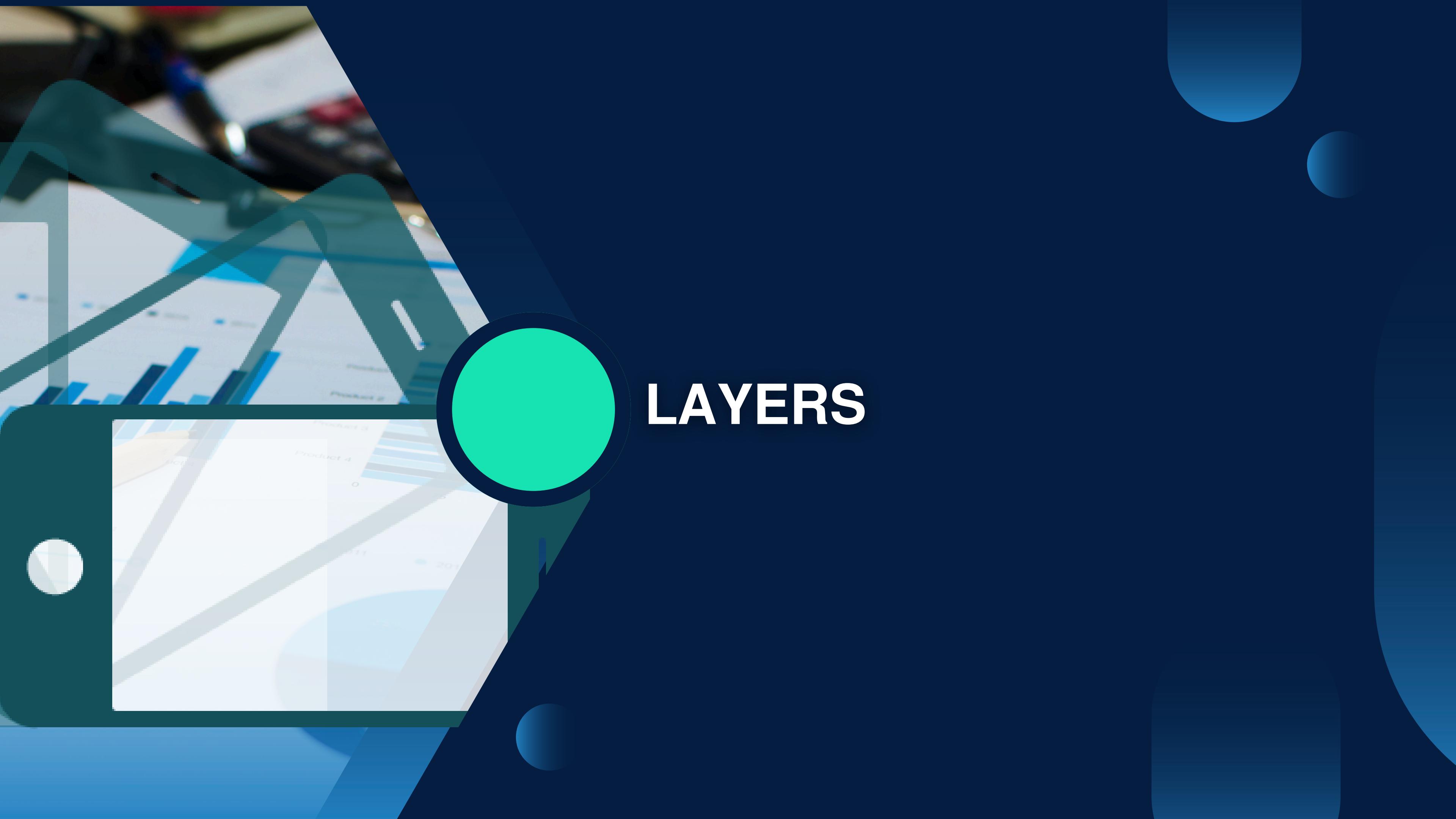


# CS4039 SOFTWARE FOR MOBILE DEVICES

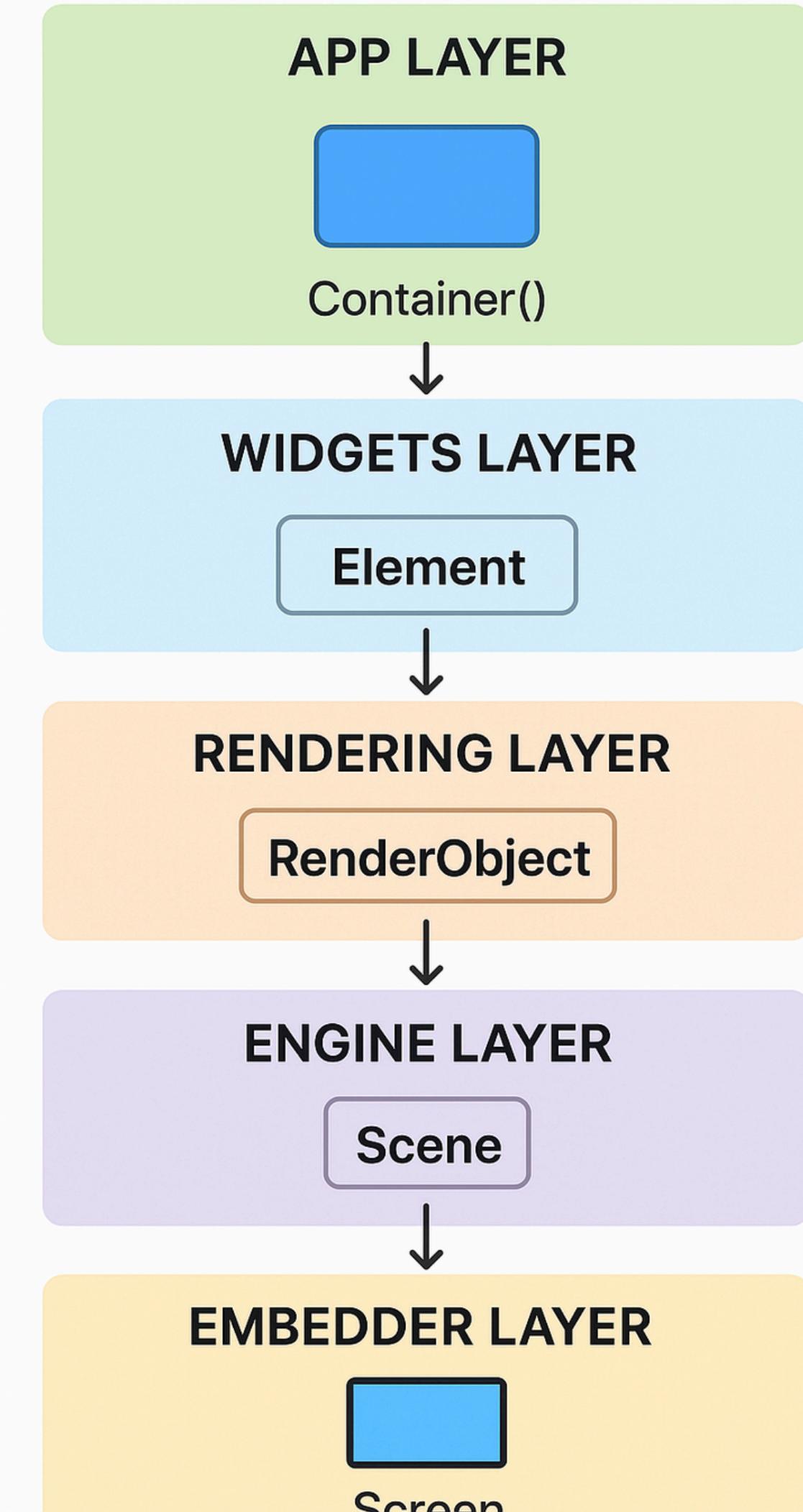




# LAYERS

# LAYERS IN FLUTTER

IN FLUTTER, THE FRAMEWORK IS BUILT IN LAYERS, EACH PROVIDING A SPECIFIC LEVEL OF ABSTRACTION — FROM LOW-LEVEL RENDERING TO HIGH-LEVEL WIDGETS. UNDERSTANDING THESE HELPS YOU KNOW WHERE YOUR CODE FITS IN THE FLUTTER ARCHITECTURE AND HOW THINGS WORK UNDER THE HOOD.





# STEP-BY-STEP THROUGH THE LAYERS

- APP LAYER (YOUR CODE)

THIS LAYER IS WHERE YOUR UI TREE IS BUILT — A HIERARCHY OF WIDGETS DESCRIBING WHAT YOU WANT TO DRAW.

YOU SAY: "I WANT A 100x100 BLUE BOX."



# STEP-BY-STEP THROUGH THE LAYERS

- **FRAMEWORK - WIDGETS LAYER**

THE CONTAINER WIDGET IS PART OF THE WIDGETS LAYER.

IT DOESN'T DRAW ANYTHING BY ITSELF – IT DELEGATES TO LOWER LAYERS:

- INTERNALLY, CONTAINER CREATES OTHER WIDGETS LIKE CONSTRAINEDBOX, DECORATEDBOX, AND ALIGN.
- THESE WIDGETS DESCRIBE LAYOUT AND PAINTING INSTRUCTIONS.



# STEP-BY-STEP THROUGH THE LAYERS

- **FRAMEWORK - RENDERING LAYER**

EACH RENDEROBJECT CORRESPONDS TO SOMETHING THAT CAN:

- LAYOUT: DECIDE SIZE AND POSITION.
- PAINT: DRAW ITSELF ONTO A CANVAS.
- HIT TEST: DETECT TOUCH INPUT.

YOUR CONTAINER EVENTUALLY MAPS TO A RENDERDECORATEDBOX INSIDE THE RENDER TREE.



## STEP-BY-STEP THROUGH THE LAYERS

- **ENGINE LAYER**

ONCE THE RENDER TREE FINISHES PAINTING, IT CREATES A SCENE OBJECT USING THE DART:UI LIBRARY (PART OF THE ENGINE LAYER).

- THIS SCENE CONTAINS DRAW COMMANDS — "DRAW A RECTANGLE WITH BLUE COLOR AT (X, Y)".
- THE ENGINE USES SKIA (C++) TO CONVERT THESE COMMANDS INTO PIXELS ON THE SCREEN.

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# STEP-BY-STEP THROUGH THE LAYERS

- EMBEDDER LAYER

EMBEDDER INTERACTS WITH THE OS TO:

- DISPLAY THE RENDERED PIXELS IN A WINDOW OR VIEW.
- HANDLE USER INPUT (TOUCH, KEYBOARD).
- PASS IT BACK UP TO THE FRAMEWORK.

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