# INTRODUCTION TO SoC

# OUTLINE

- SOC design flow

- System level design issues

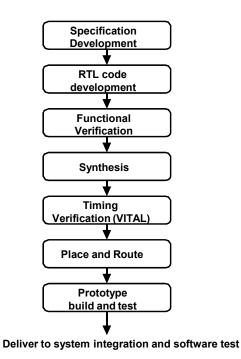- Macro design flow

# SOC Design Process

- SOC design flow
- System level design issues
- Macro design flow

# 1. SOC Design Flow

- To meet challenges of SOC, design flow changes  from
  - From a waterfall model to a **spiral model**
  - From a top-down to a **combination** of top-down and  bottom-up

# TRADITIONAL ASIC DESIGN FLOW

- Waterfall model

- Recursive
  - "From error to where ?"

- Verification Strategy
  - "Design is becoming COMPLEX !"

- Time-To-Market Pressure

- What's the problem
  - Handoff are rarely clean
  - Larger, deep submicron designs
    - co-development for HW and SW
    - Physical issues

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┌─────────────────┐
│ Specification   │
│ Development     │
└─────────────────┘
        │
        ▼
┌─────────────────┐
│ RTL code        │
│ development     │
└─────────────────┘
        │
        ▼
┌─────────────────┐
│ Functional      │
│ Verification    │
└─────────────────┘
        │
        ▼
┌─────────────────┐
│ Synthesis       │
└─────────────────┘
        │
        ▼
┌─────────────────┐
│ Timing          │
│ Verification (VITAL) │
└─────────────────┘
        │
        ▼
┌─────────────────┐
│ Place and Route │
└─────────────────┘
        │
        ▼
┌─────────────────┐
│ Prototype       │
│ build and test  │
└─────────────────┘
        │
        ▼
```

**Deliver to system integration and software test**

# SOC Design Process

- Evolution: waterfall to spiral model
  - Addressing these problems concurrently
    - Functionality,
    - Timing,
    - Physical design and
    - Verification
  - Incrementally improving as design converges

- Top-down to combination of top-down and bottom-up
  - Bottom-up with critical low-level blocks, reuse soft or hard macros