MULTI-VIEW ARCHITECTURE DESCRIPTION AND ENFORCEMENT

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ARCHITECTURE DESCRIPTION LANGUAGES (ADLs)

- Formal syntax and semantics for performance-critical systems
- Analyzable model for large scale systems
- Separation of concerns

AADL  ACME  ArchJava
ARCHITECTURAL DRIFT AND EROSION

- As-intended vs. as-implemented gap

```java
client.socket(databaseAddr, 80);
import FileIO;
```
- Capability safety
- Modules and module functors
- Metaprogramming
Wyvern Modules

module def Logger(write: FileIO)

def log(): String

...
Wyvern

- Capability Safety
- Metaprogramming

ArchWyvern

- Structural security
- Architectural integrity in runtime semantics
component Client
  port getInfo: requires CSIface

module def Client(getInfo: CSIface)
...
**ArchWyvernn Connectors**

**connector JSONCtr**
- val host: String
- val prt: Int

**type JSONCtr**
- val host: String
- val prt: Int
  - metadata new
  - ...

ArchWyvern Architecture Description

architecture TwoTier
  components
    Client client
    Server server
  connectors
    JSONCtr jsonCtr
  ...

...
CODE GENERATION AND METAPROGRAMMING

type JSONCtr
    val host: String
    val prt: Int
    metadata new
    ...

ArchWyvern Pipeline

- component...
- connector...
- architecture...

- module def
- type
- module def
- module def
- top level wyv

interpreter
IN SUMMARY

• As-intended architectural integrity at deployment
• High-level description tied to implementation
• Increased ease of software evolution
• Increased formalization and empirical work in the future

module def TCPClient(net: Network, con: JSONCtrl, client: Client)
def entryPoint(): Unit
    net.socket(client.addr);
    net.connect(con.serverAddr)
    ...

Client → Server → Database
Thank You!