Techniques and Tools for the Management and Operation of NFV and SDN Networks

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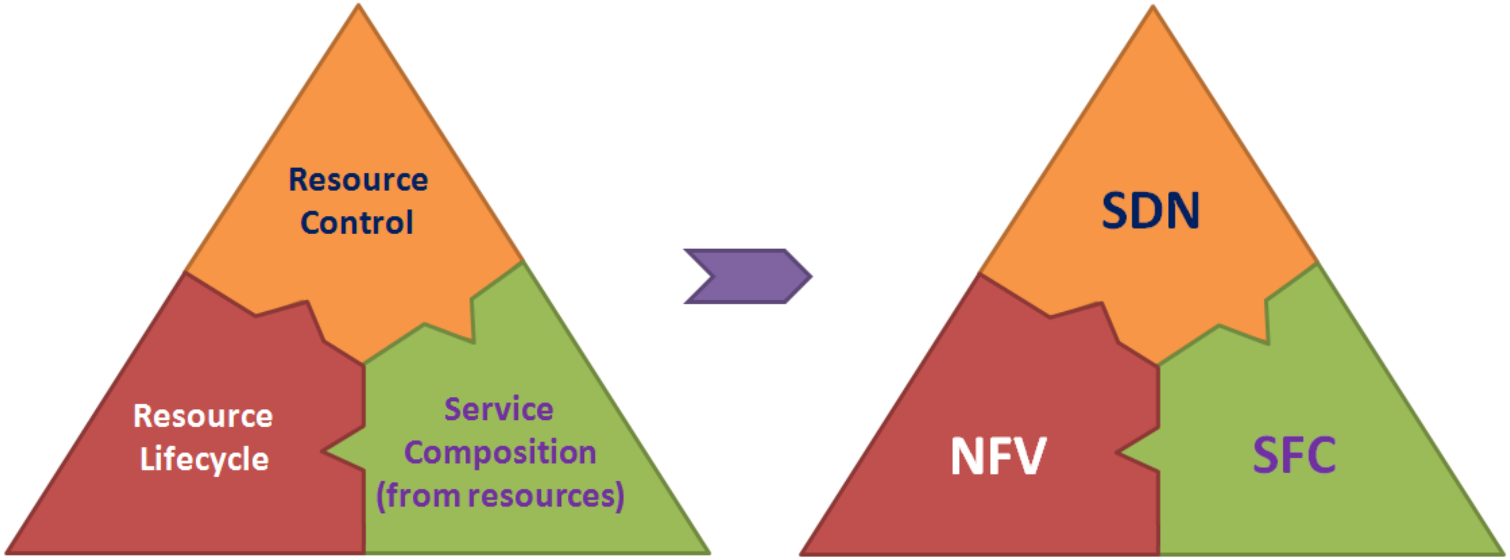
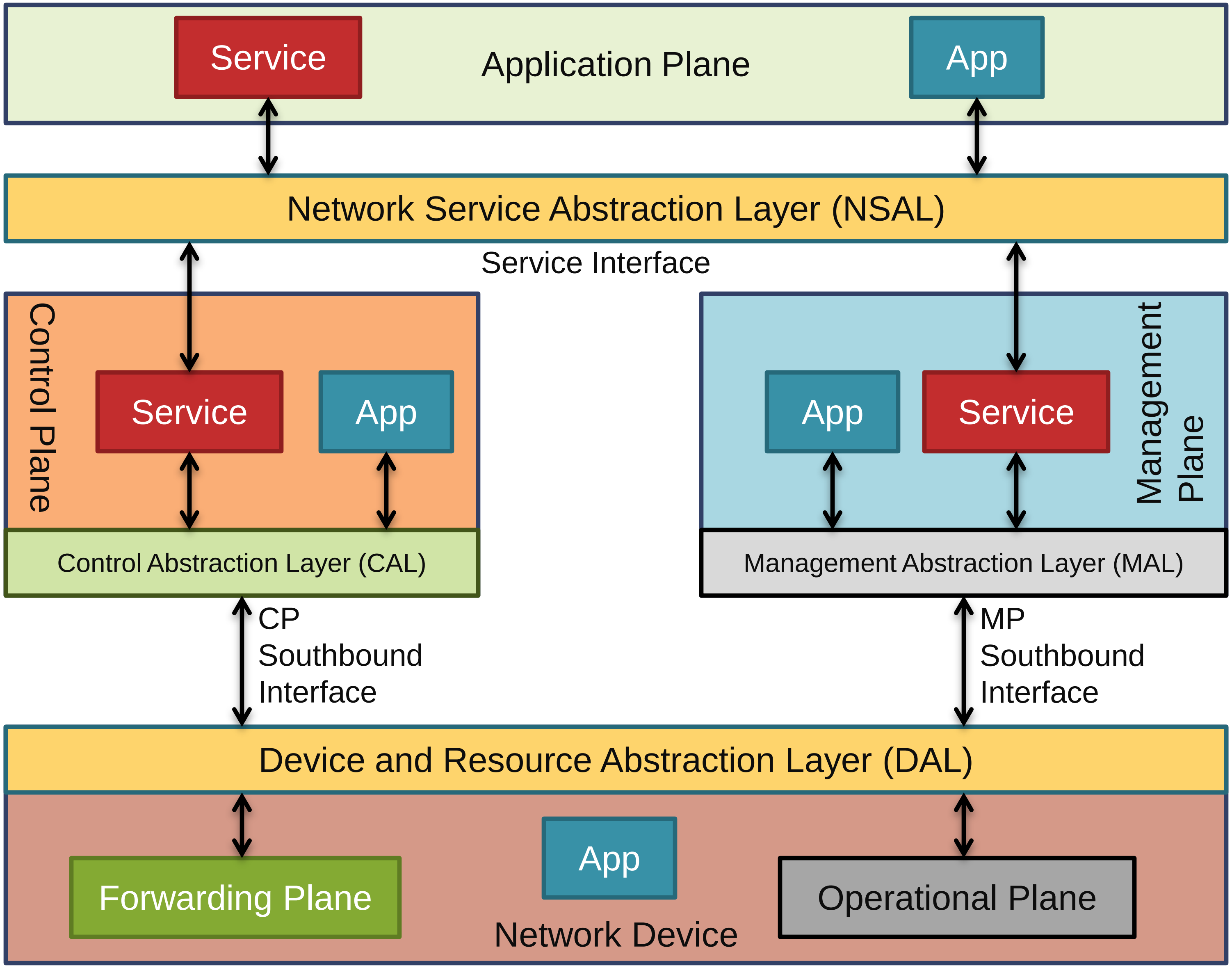
Evangelos Haleplidis
Jamal Hadi Salim
Kostas Pentikousis

Network of Resources

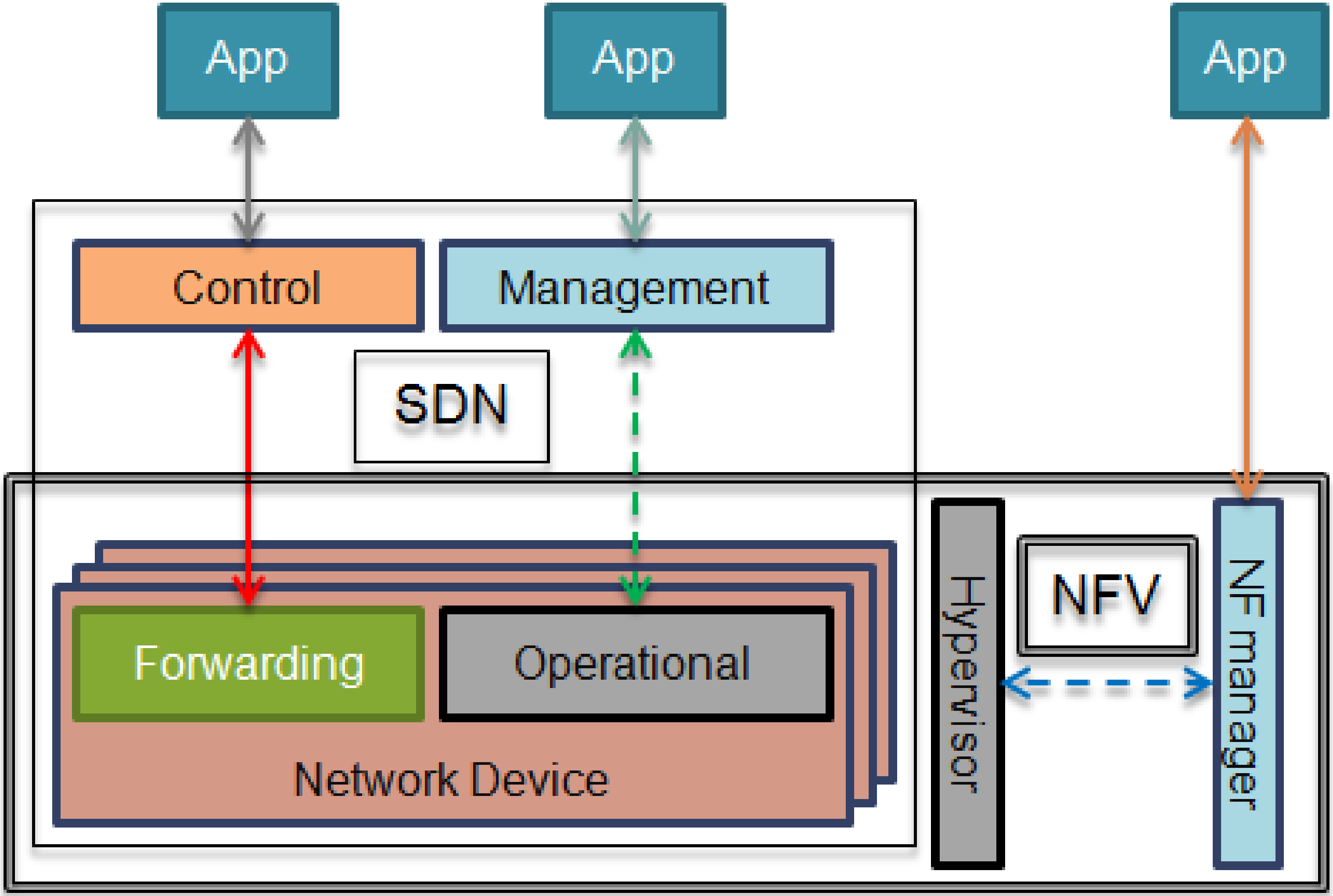
- Software Defined Networking (SDN)
  - Resource control
- Network Functions Virtualization (NFV)
  - Resource Lifecycle
  - Instantiation to destroy
- Service Function Chaining (SFC)
  - Resource chaining



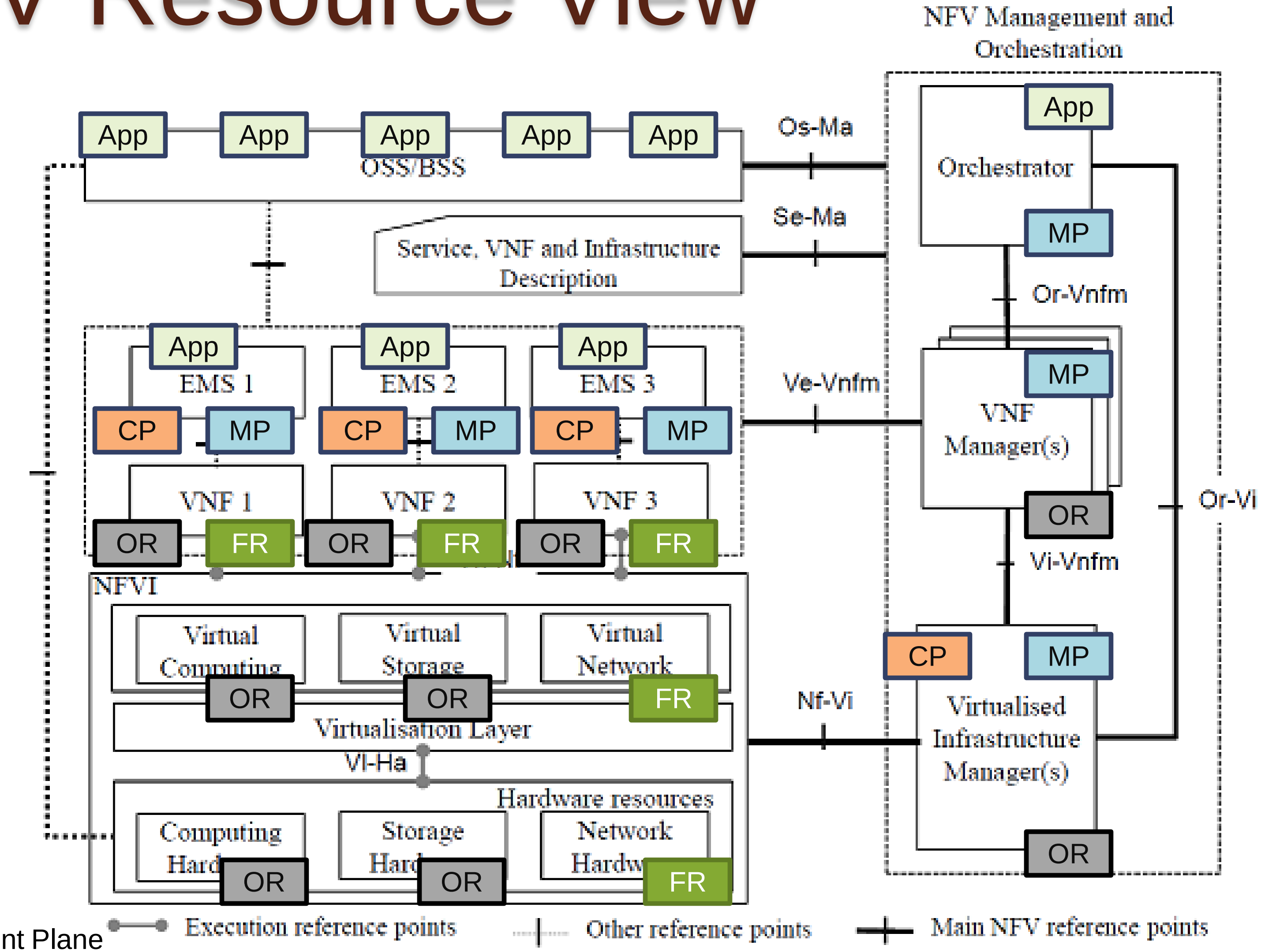
Software-Defined Networking RFC 7426



SDN & NFV

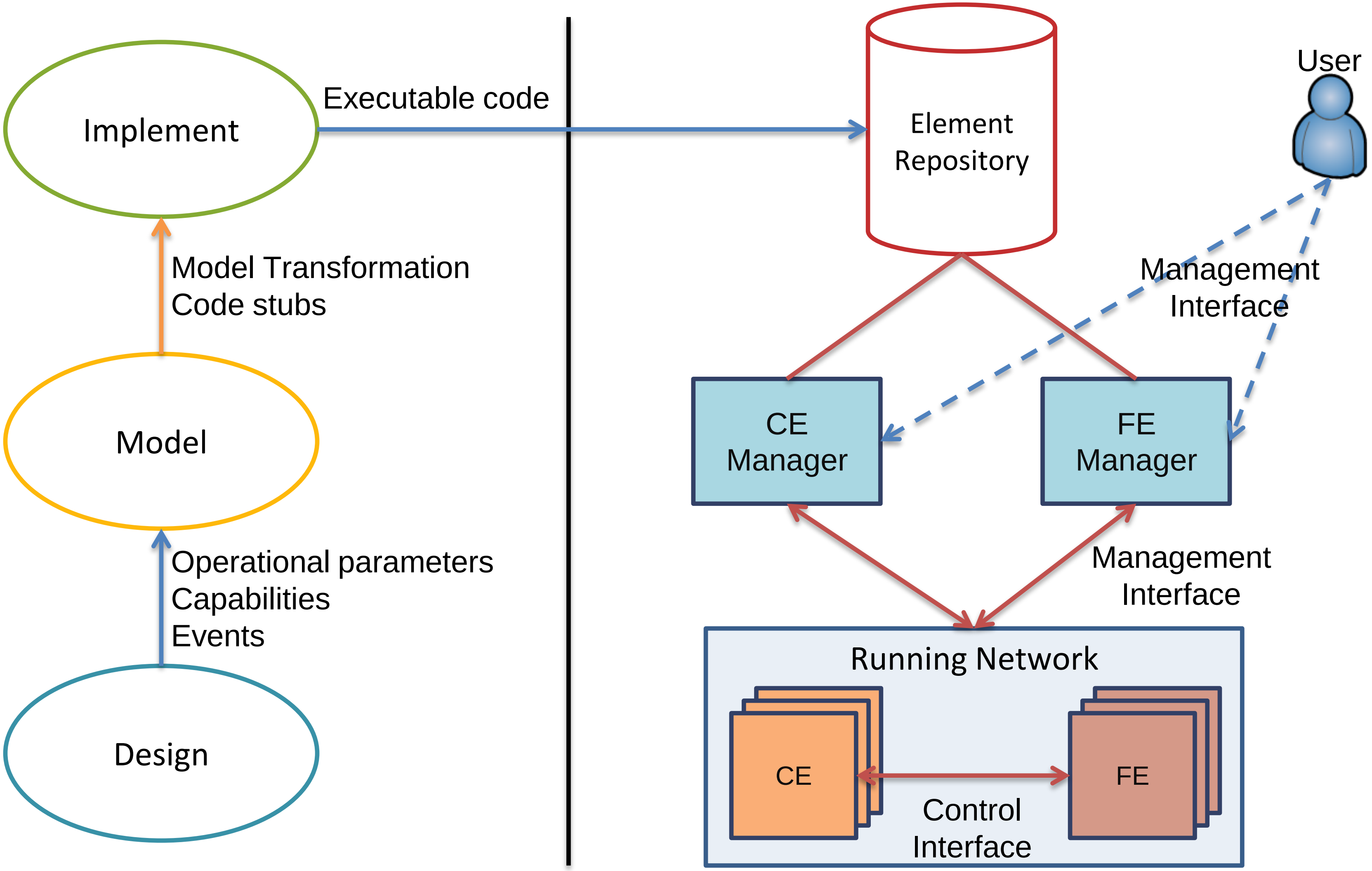

App
App
App
Control
Management
SDN
Forwarding
Operational
Network Device
Hypervisor
NFV
NF manager

NFV Resource View



App	Application
MP	Management Plane
CP	Control Plane
OR	Operational Resource
FR	Forwarding Resource

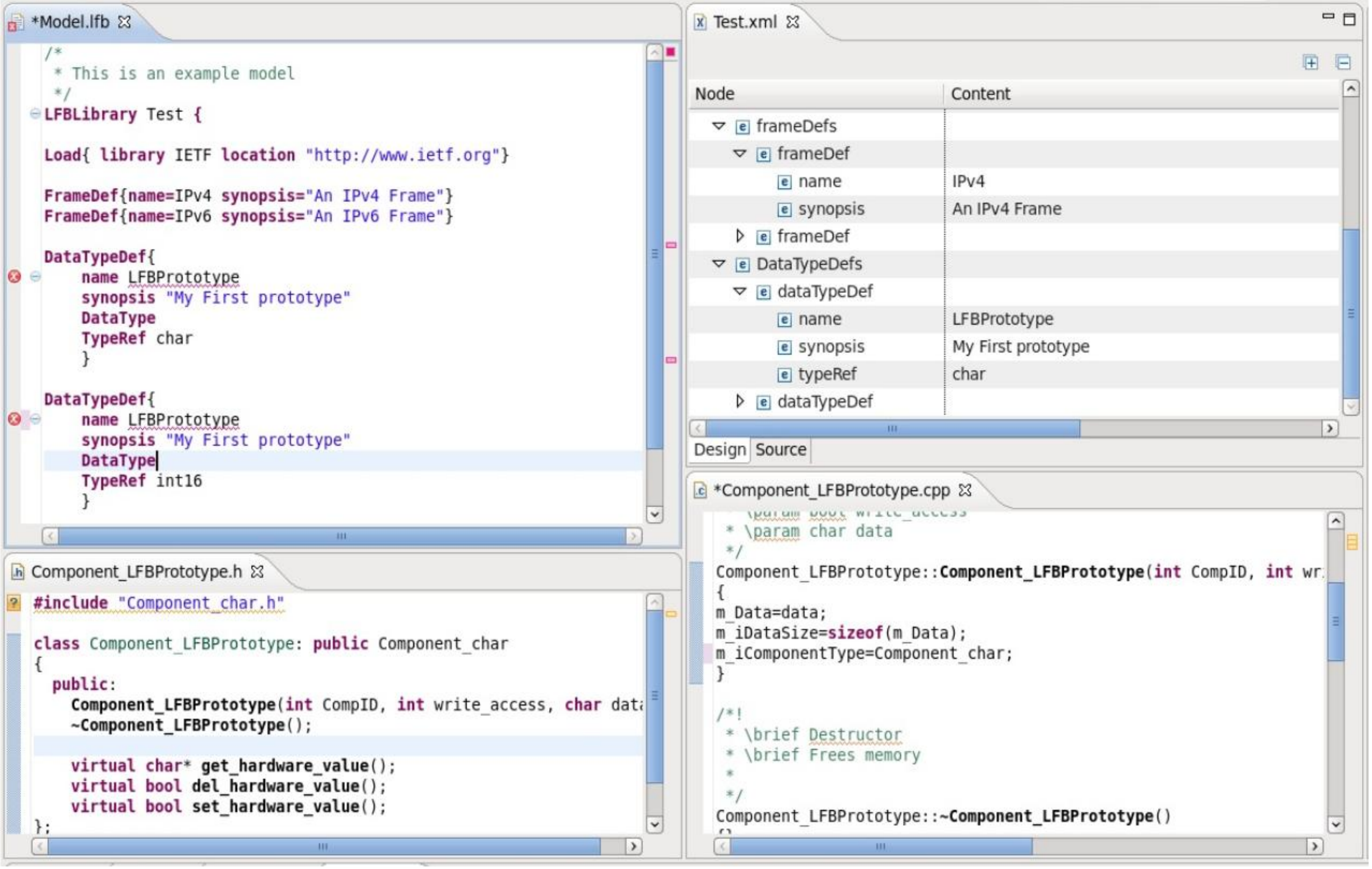
Design, Modeling & Implementation



Offline Phase

Online Phase

Domain Specification Language



```
/*
 * This is an example model
 */
LFBLibrary Test {

Load{ library IETF location "http://www.ietf.org"}

FrameDef{name=IPv4 synopsis="An IPv4 Frame"}
FrameDef{name=IPv6 synopsis="An IPv6 Frame"}

DataTypeDef{
    name LFBPrototype
    synopsis "My First prototype"
    DataType
    TypeRef char
    }

DataTypeDef{
    name LFBPrototype
    synopsis "My First prototype"
    DataType
    TypeRef int16
    }
```

Node	Content
frameDefs	
frameDef	
name	IPv4
synopsis	An IPv4 Frame
frameDef	
DataTypeDefs	
dataTypeDef	
name	LFBPrototype
synopsis	My First prototype
typeRef	char
dataTypeDef	

```
#include "Component_char.h"

class Component_LFBPrototype: public Component_char
{
  public:
    Component_LFBPrototype(int CompID, int write_access, char dat
    ~Component_LFBPrototype();

    virtual char* get_hardware_value();
    virtual bool del_hardware_value();
    virtual bool set_hardware_value();
};
```

```
  * \param bool write_access
 * \param char data
 */
Component_LFBPrototype::Component_LFBPrototype(int CompID, int wr
{
m_Data=data;
m_iDataSize=sizeof(m_Data);
m_iComponentType=Component_char;
}

/*!
 * \brief Destructor
 * \brief Frees memory
 *
 */
Component_LFBPrototype::~Component_LFBPrototype()
```

Future Directions

- Abstractions models
  - Discuss a common set of abstraction models, e.g.
    - Hypervisors
    - Network Functions
- IETF/IRTF Applicability
  - SDN RG (follow-up of RFC 7426)
  - NFV RG (abstractions)
  - NM RG (e.g. autonomic aspects)
  - NWC RG (e.g. enhance RFC 7426)