An Object-Oriented ISAKMP Implementation

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Contents

- What is ISAKMP
- What is Jacob Framework
- How ISAKMP can be implemented with help of Jacob

Internet Security Architecture

- The Internet is based on TCP/IP protocols - no security

- IP Security Protocol (IPSEC) provides authentication, confidentiality and integrity

- IPSEC does not provide key exchange and management

Internet Security Association and Key Management Protocol

- RFC 2408 (November 1998)
- Authentication and Key Management
- ISAKMP is a framework
- Internet Key Exchange (IKE)

ISAKMP

- Two phases
- Security Association (SA)
- 13 Payloads
- 5 Exchanges
- Cookie

ISAKMP Header

<table>
<tr><td colspan="5">Initiator
Cookie</td></tr>
<tr><td colspan="5">Responder
Cookie</td></tr>
<tr><td>Next Payload</td><td>MjVer</td><td>MnVer</td><td>Exchange Type</td><td>Flags</td></tr>
<tr><td colspan="5">Message ID</td></tr>
<tr><td colspan="5">Length</td></tr>
</table>

Exchange Types

- Base Exchange (4 msgs)

- Identity Protection Exchange (6 msgs)

- Authentication Only Exchange (3 msgs)

- Aggressive Exchange (3 msgs)

- Informational Exchange (1 msg)

Base Exchange

Alice						Bob
	HDR	SA	Proposal	Transform	Nonce	→
←	HDR	SA	Proposal	Transform	Nonce	
	HDR	KE	IDii	AUTH		→
←	HDR	KE	IDir	AUTH		

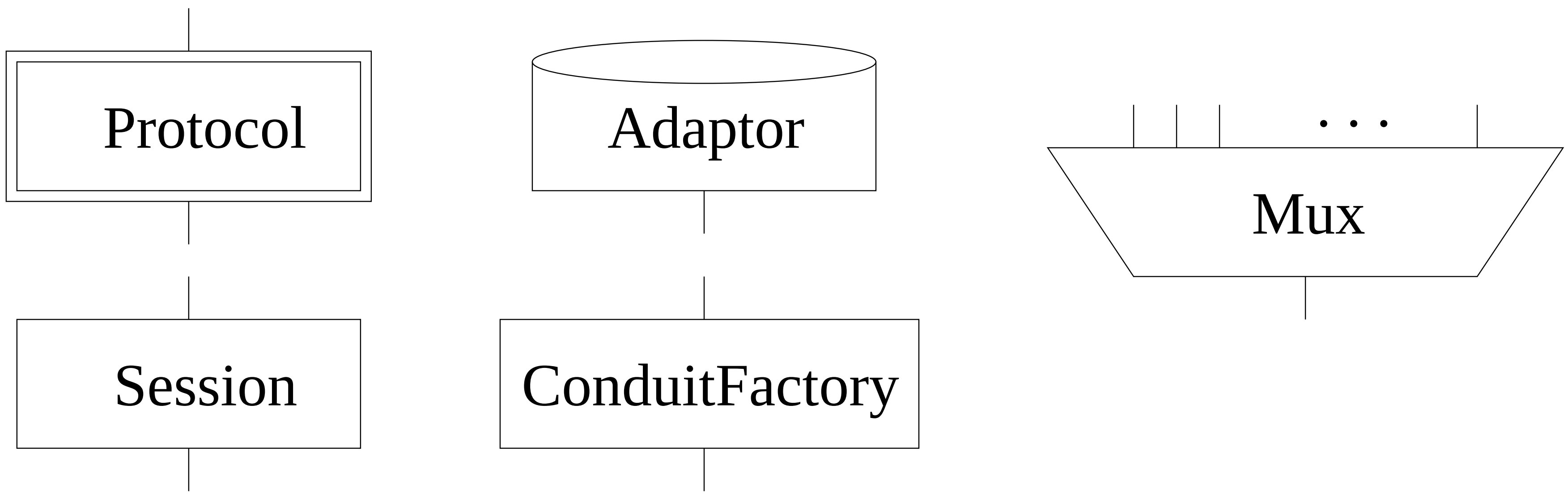
Java Conduits Framework (Jacob)

- Jacob is based on Hueni's, Johnson's and Engel's Conduits+ framework

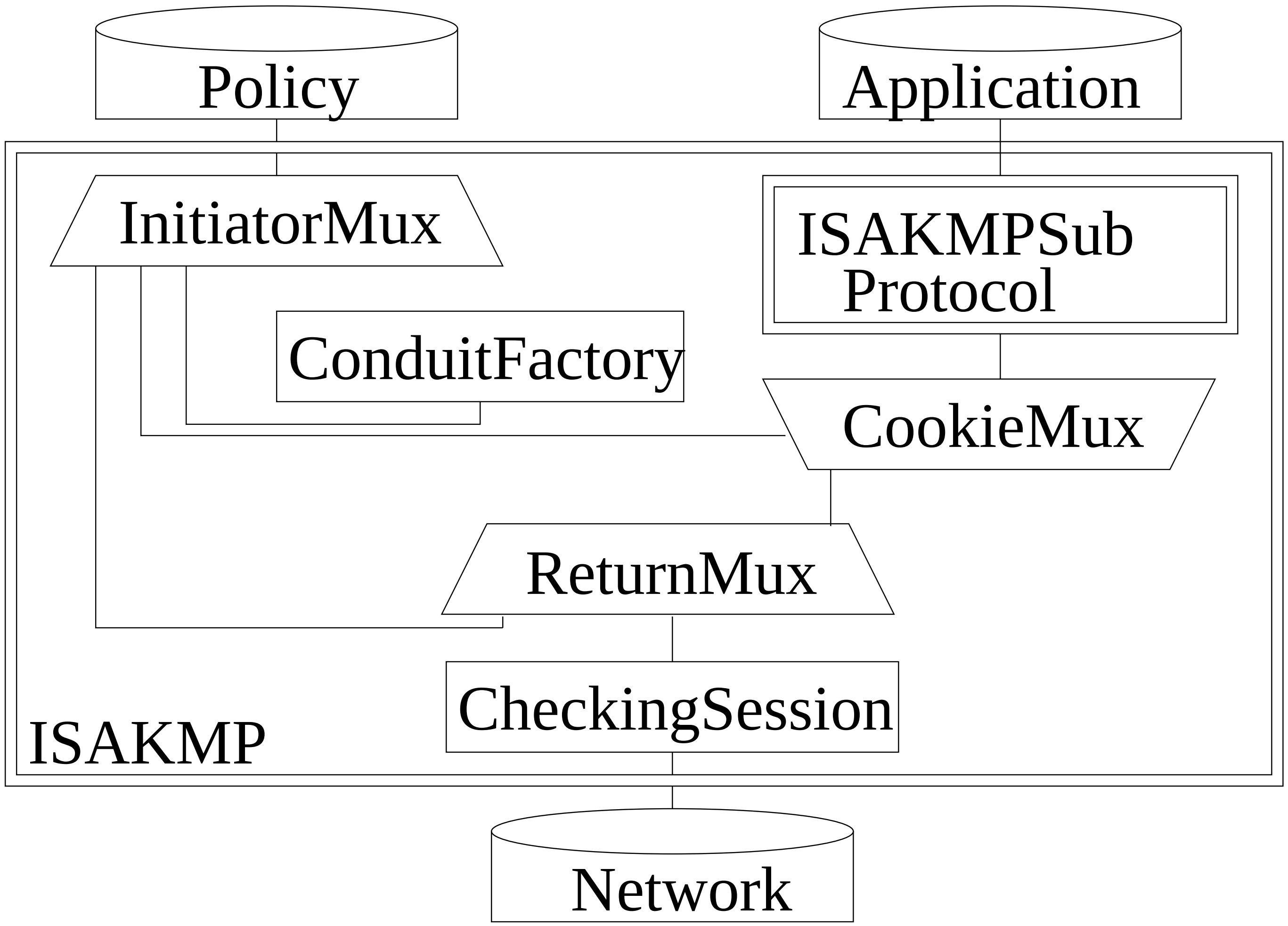
- Jacob is developed at HUT

- Jacob helps implementing cryptographic communication protocols

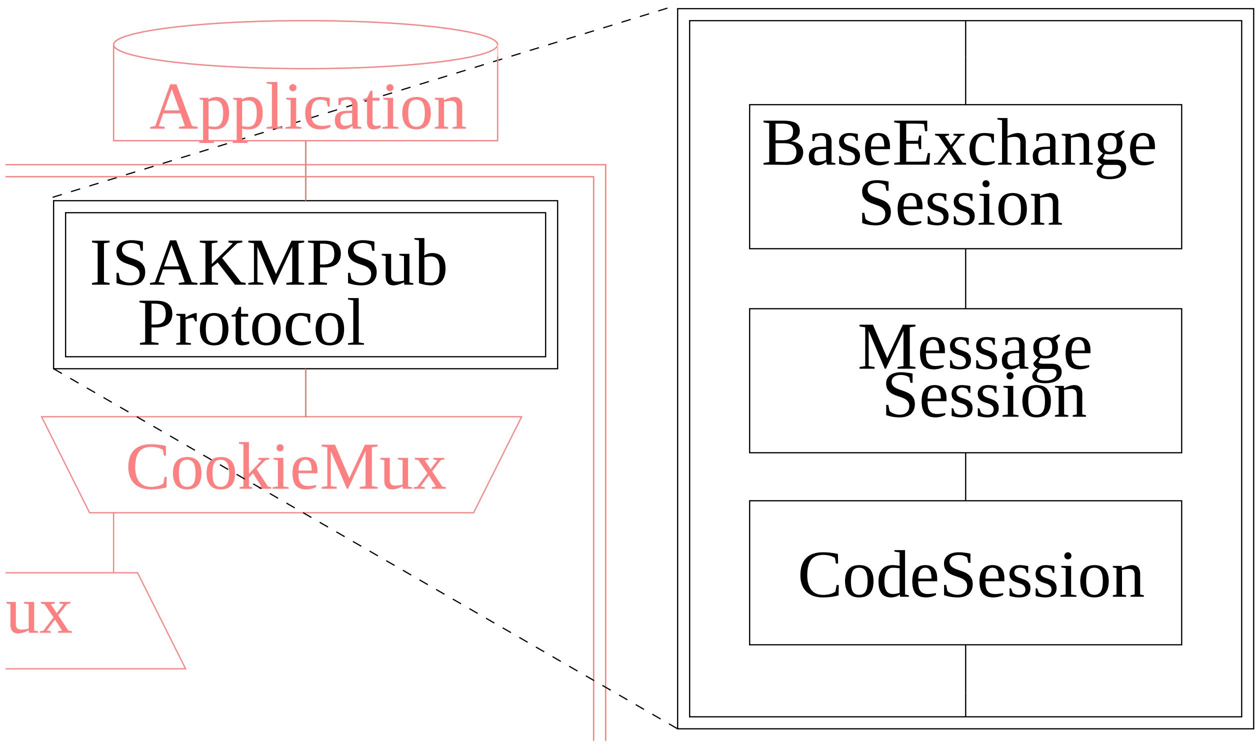
Conduits in Jacob



Conduits+ graph of ISAKMP

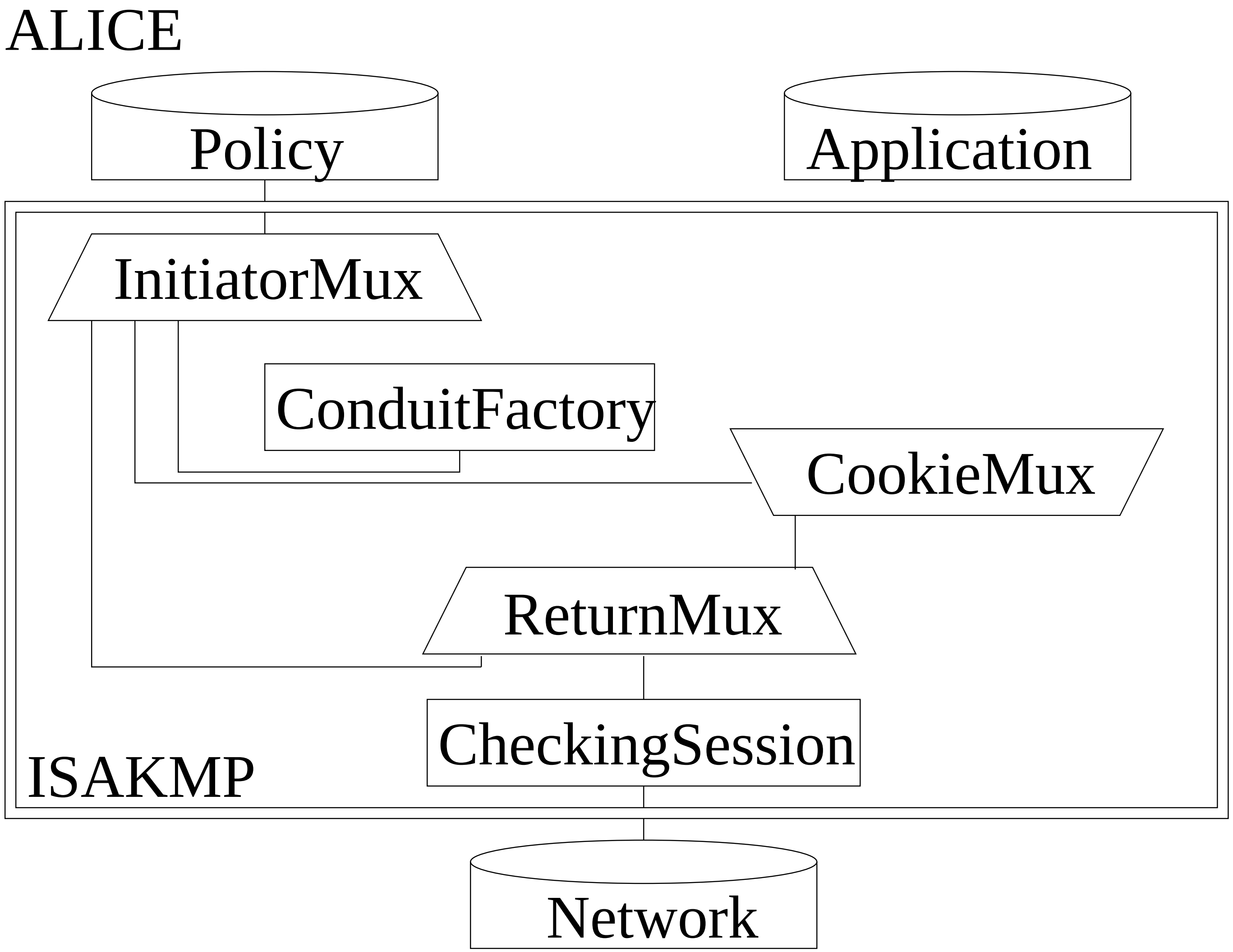

Policy
Application
InitiatorMux
ISAKMPSub Protocol
ConduitFactory
CookieMux
ReturnMux
CheckingSession
ISAKMP
Network

ISAKMPBaseExchangeSubProtocol



Alice Wants a Secure Connection with Bob

- Next slides shows how a new connection is established using Base Exchange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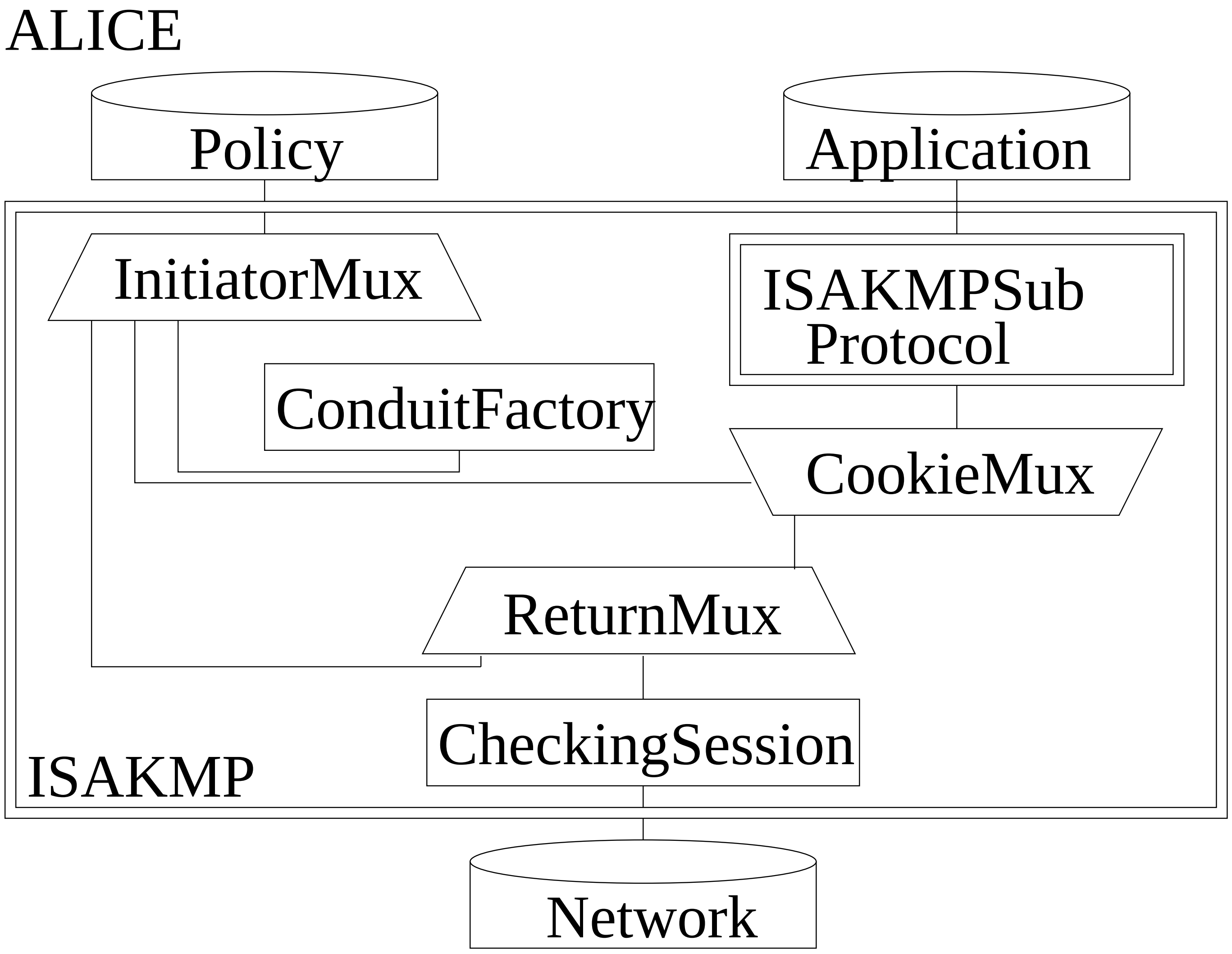
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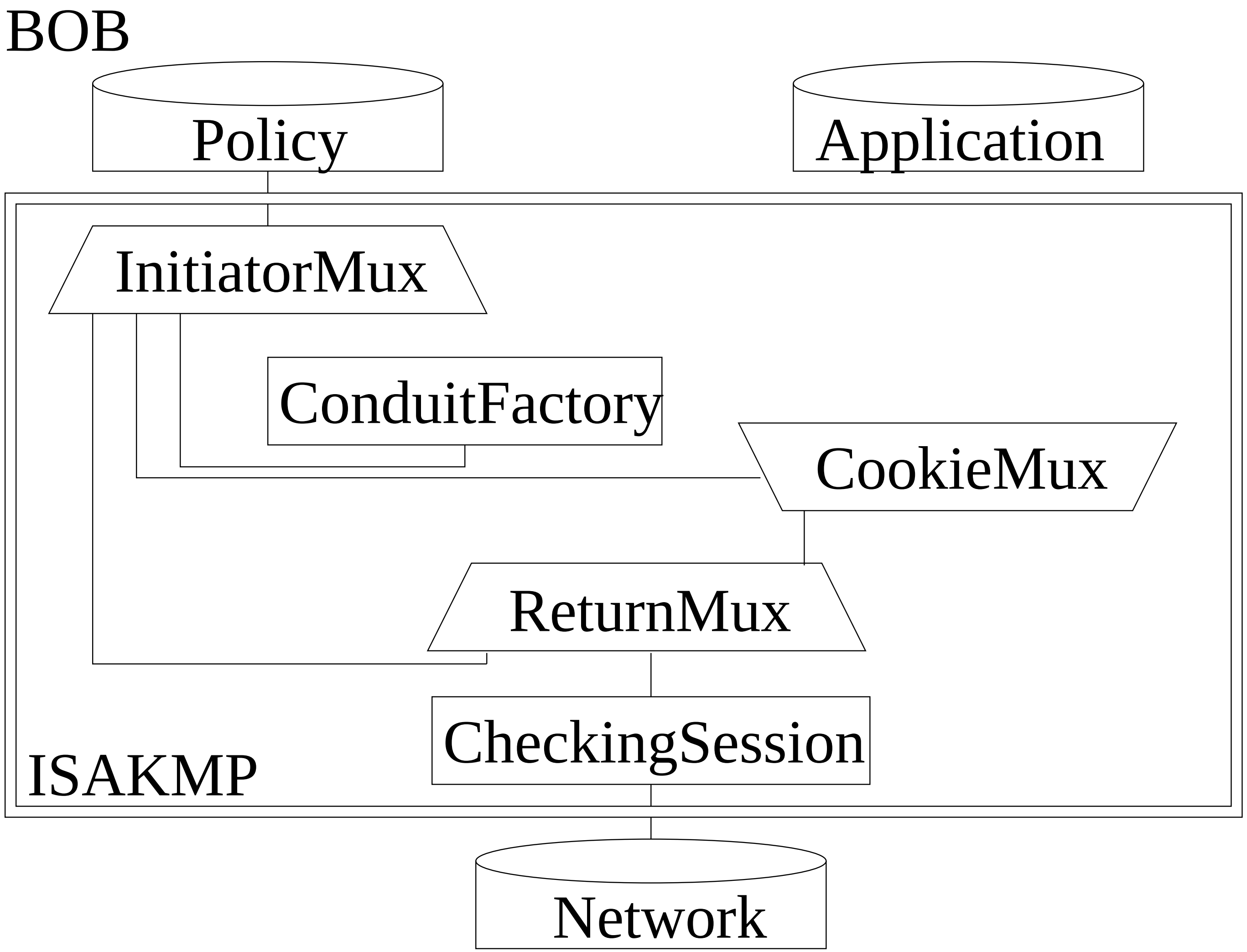
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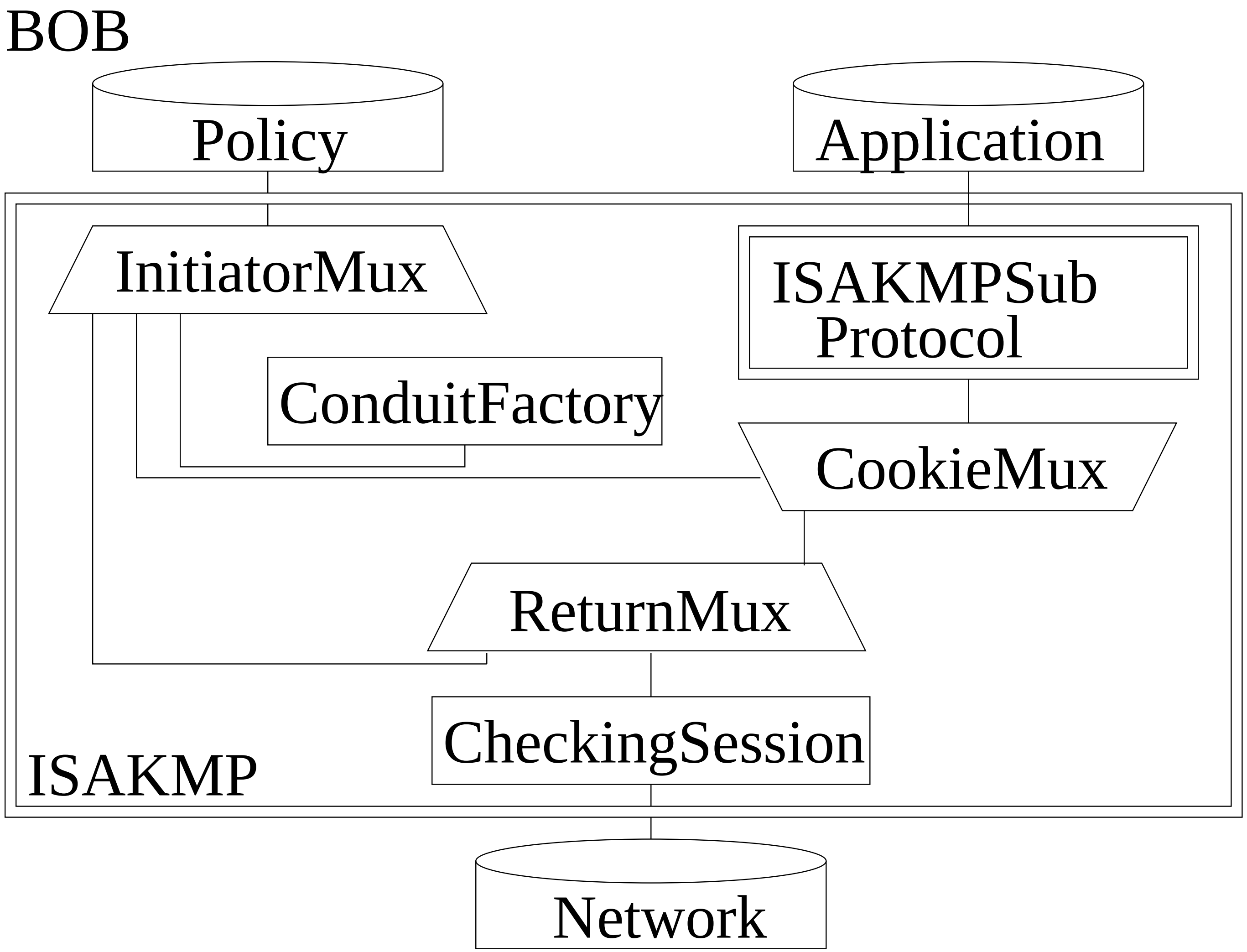
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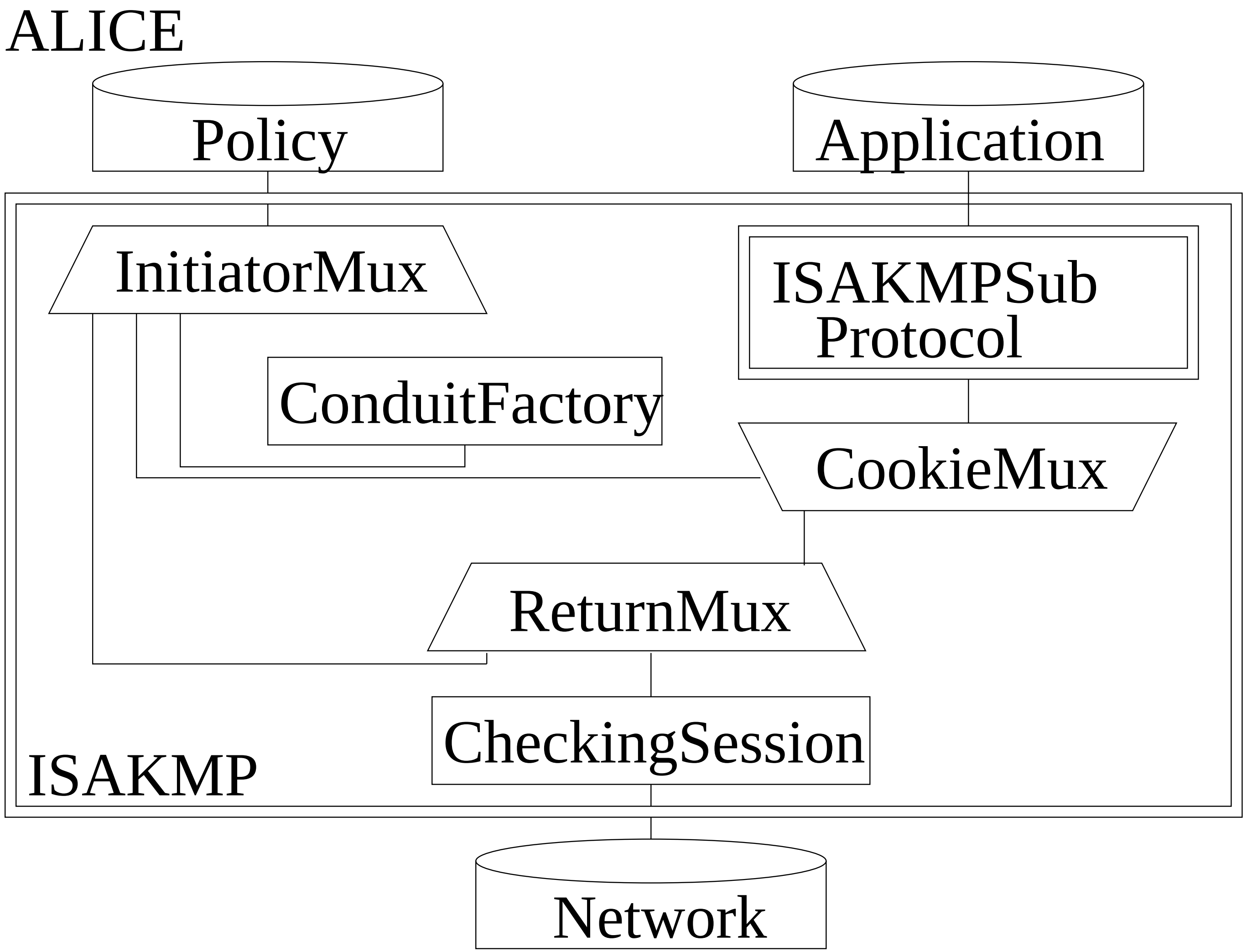
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Experiences

- The idea of a framework is good
- Understanding the framework takes time
- ISAKMP's RFC supports functional programming, not OO-programming
- Adding new exchanges to ISAKMP is easy

More information

- <URL:http://www.tcm.hut.fi/Research/TeSSA/>