

# Credo: Modeling and analysis of evolutionary structures for distributed services

Einar Broch Johnsen

Department of Informatics, University of Oslo, Norway

FMCO, Antibes, 23. Oct. 2008



# What is CREDO?

## Modeling and analysis of evolutionary structures for distributed services

- **Aim:** Compositional modeling and validation framework for dynamically evolving software
- **Separation of concerns:** computation, coordination, scheduling
- **Partners**
  - **Academic:** CWI Amsterdam, U Oslo, U Kiel, TU Dresden, UNU-IIST Macau, U Uppsala
  - **Almende:** ASK system – dynamically connecting people
  - **Rikshospitalet, NCC:** Biomedical sensor networks
- **Project duration:** 3 years from Sep. 2006 (FP6, STREP)

# What is CREDO?

## Modeling and analysis of evolutionary structures for distributed services

- **Aim:** Compositional modeling and validation framework for dynamically evolving software
- **Separation of concerns:** computation, coordination, scheduling
- **Partners**
  - **Academic:** CWI Amsterdam, U Oslo, U Kiel, TU Dresden, UNU-IIST Macau, U Uppsala
  - **Almende:** ASK system – dynamically connecting people
  - **Rikshospitalet, NCC:** Biomedical sensor networks
- **Project duration:** 3 years from Sep. 2006 (FP6, STREP)

# What is CREDO?

## Modeling and analysis of evolutionary structures for distributed services

- **Aim:** Compositional modeling and validation framework for dynamically evolving software
- **Separation of concerns:** computation, coordination, scheduling
- **Partners**
  - Academic: CWI Amsterdam, U Oslo, U Kiel, TU Dresden, UNU-IIST Macau, U Uppsala
  - Almende: ASK system – dynamically connecting people
  - Rikshospitalet, NCC: Biomedical sensor networks
- **Project duration:** 3 years from Sep. 2006 (FP6, STREP)

# What is CREDO?

## Modeling and analysis of evolutionary structures for distributed services

- **Aim:** Compositional modeling and validation framework for dynamically evolving software
- **Separation of concerns:** computation, coordination, scheduling
- **Partners**
  - **Academic:** CWI Amsterdam, U Oslo, U Kiel, TU Dresden, UNU-IIST Macau, U Uppsala
  - **Almende:** ASK system – dynamically connecting people
  - **Rikshospitalet, NCC:** Biomedical sensor networks
- **Project duration:** 3 years from Sep. 2006 (FP6, STREP)

# Modeling

- **Creol**

- Executable OO modeling
- Active objects, futures, support for reprogramming
- Abstracts from internal scheduling
- ADTs for internal state
- Abstracts from environment/network properties

- **Coordination & scheduling**

- Reo: general coordination language
- Network behavior: (mobile) channels with various properties
- Application-specific schedulers for intra-object processes

# Modeling

- **Creol**

- Executable OO modeling
- Active objects, futures, support for reprogramming
- Abstracts from internal scheduling
- ADTs for internal state
- Abstracts from environment/network properties

- **Coordination & scheduling**

- Reo: general coordination language
- Network behavior: (mobile) channels with various properties
- Application-specific schedulers for intra-object processes

# Validation

- **Approach:** Lightweight, not deductive techniques
- **Validation** by automatable techniques
  - Simulation: Creol interpreter allows querying-driven simulation
  - Type-based analysis: both for concurrent objects and network
  - Testing: both for concurrent objects and network
  - Model checking: esp. for coordination/schedulers aspects

## Talks today

- **M. Kyas:** OO models and Heterogeneous Networks
- **B. Aichernig:** Testing Concurrent Objects
- **S. Klüppenholz:** Verifying Dynamic Coordination Models



# Validation

- **Approach**: Lightweight, not deductive techniques
- **Validation** by automatable techniques
  - Simulation: Creol interpreter allows querying-driven simulation
  - Type-based analysis: both for concurrent objects and network
  - Testing: both for concurrent objects and network
  - Model checking: esp. for coordination/schedulers aspects

## Talks today

- **M. Kyas**: OO models and Heterogeneous Networks
- **B. Aichernig**: Testing Concurrent Objects
- **S. Klüppenholz**: Verifying Dynamic Coordination Models

# Validation

- **Approach**: Lightweight, not deductive techniques
- **Validation** by automatable techniques
  - Simulation: Creol interpreter allows querying-driven simulation
  - Type-based analysis: both for concurrent objects and network
  - Testing: both for concurrent objects and network
  - Model checking: esp. for coordination/schedulers aspects

## Talks today

- **M. Kyas**: OO models and Heterogeneous Networks
- **B. Aichernig**: Testing Concurrent Objects
- **S. Klüppenholz**: Verifying Dynamic Coordination Models