

Time & Composition

OGF26, NSI-wg

Sebastien Soudan <sebastien.soudan@ens-lyon.fr>

RESO/LIP/INRIA

May 28, 2009

Joint work with Tomohiro Kudoh and Pascale Vicat-Blanc Primet



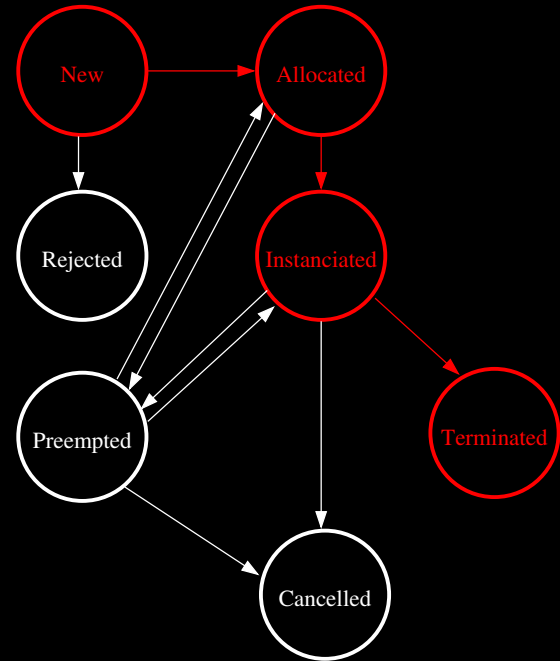
Outline

- 1 Transactions & Temporal Constraints
- 2 Types of Request & Guard Times
- 3 Composition

Reservations' states

Normal journey:

- 1 New,
- 2 Allocated,
- 3 Instanciated,
- 4 Terminated.



Operations

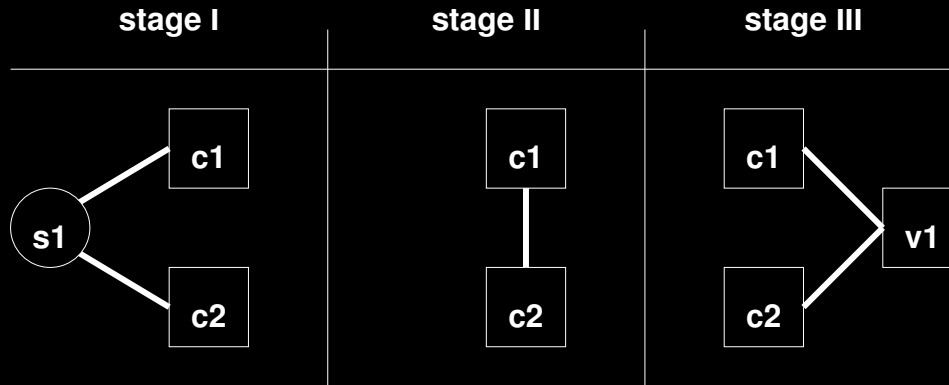
Operations:

- `reserve()`: submit the request
- `instanciate()` (optional): make resources available
- `cancel()`: cancel reservation
- `modify()`: modify attributes of a reservation

Outline

- 1 **Transactions & Temporal Constraints**
- 2 Types of Request & Guard Times
- 3 Composition

Workflow



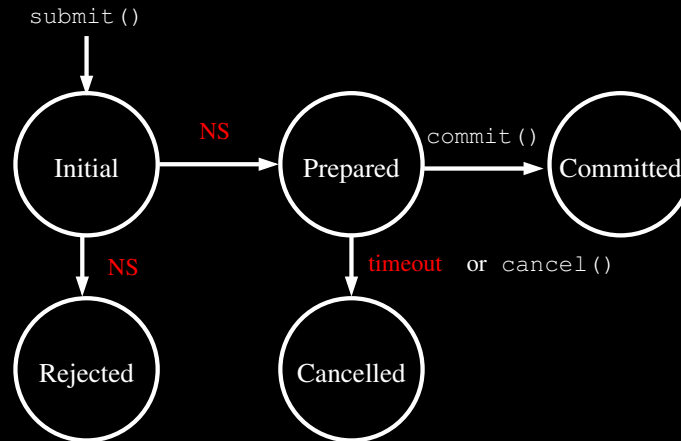
A workflow with 3 stages, at each stages some links are required. If one is missing, the other reservations are useless.

Two-phase commit allows to reserve on different NS and get all the reservations or none.

Two-phase Commit for Operations

Operations are the command issued by the users to NS that are supposed to modify the state of a reservation.

Basic functions: `submit()`/`poll()`/`commit()`/`cancel()`



Since this process pre-reserve ressources, it has to be time constrained.

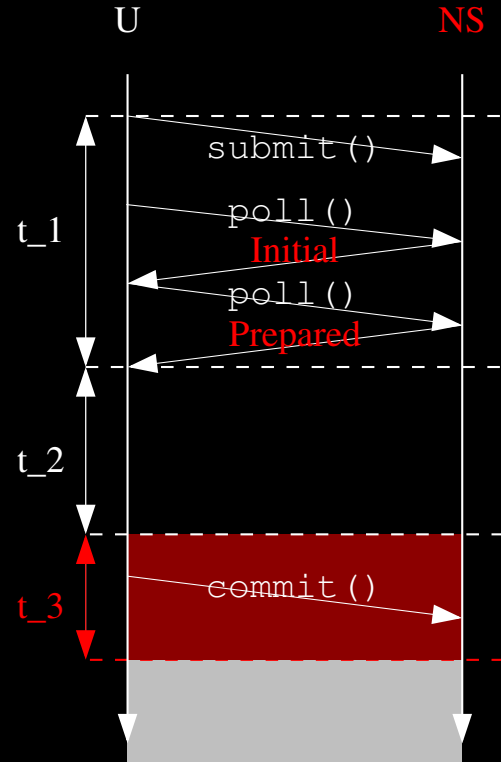
Time Constraints on the transaction

U → **NS**

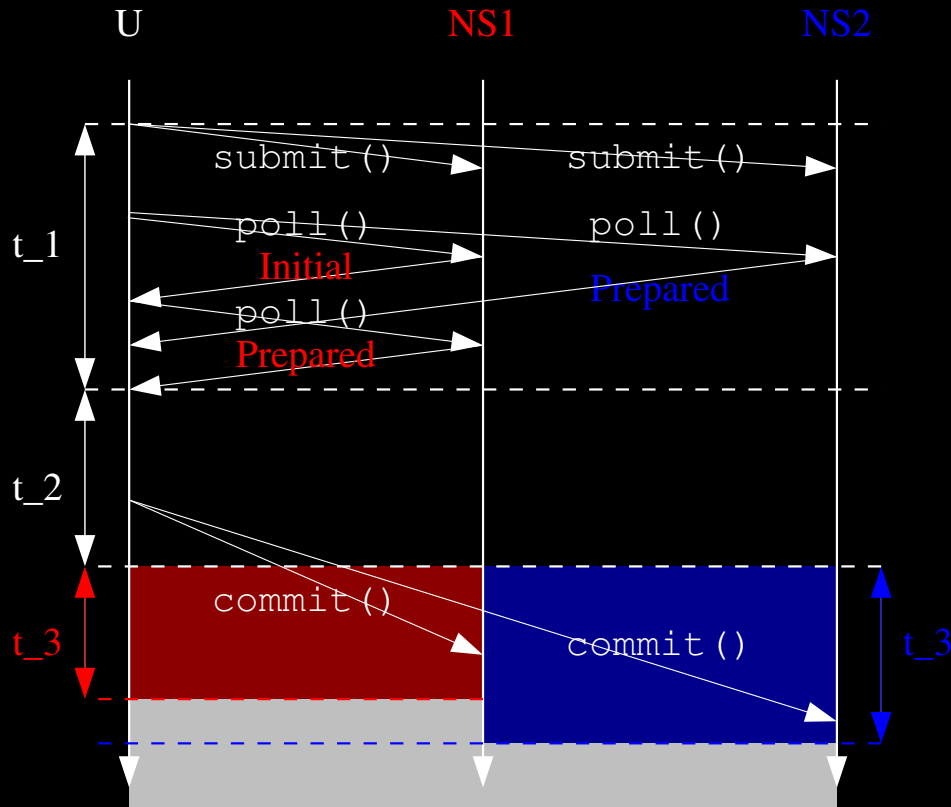
- **NS** must update the state before t_1
- **U** said he won't be able to `commit()` before $t_1 + t_2$

NS → **U**

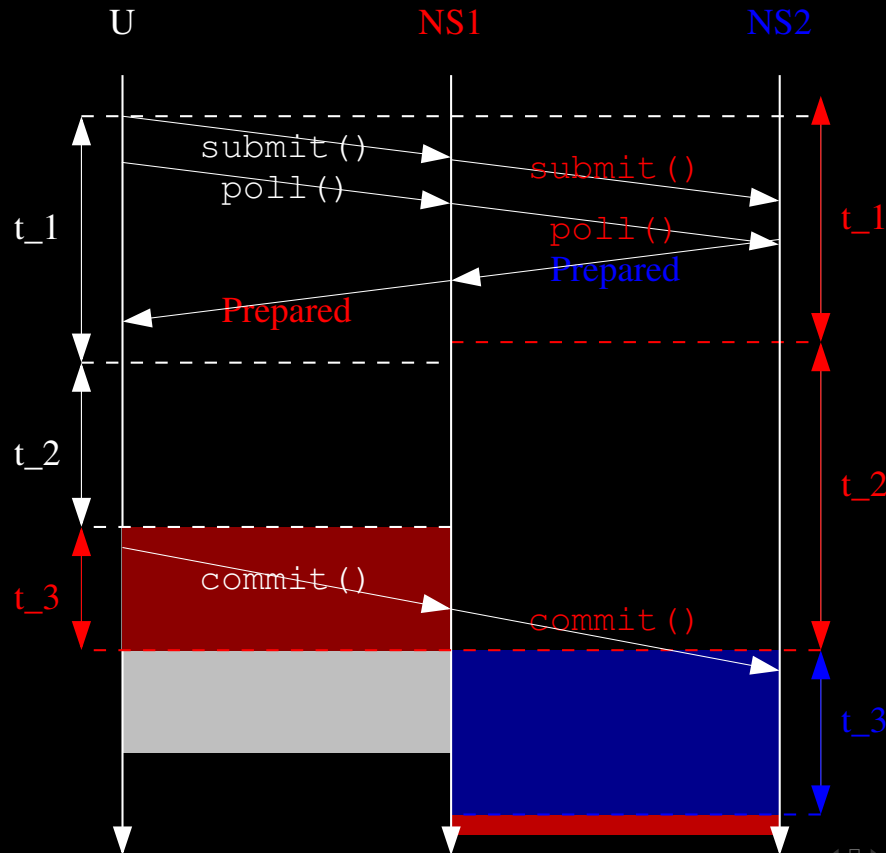
- **U** must `commit()` before $t_1 + t_2 + t_3$



Time Constraints on the transaction — Tree



Time Constraints on the transaction — Chain



Outline

- 1 Transactions & Temporal Constraints
- 2 Types of Request & Guard Times**
- 3 Composition

Types of Request

Type of requests:

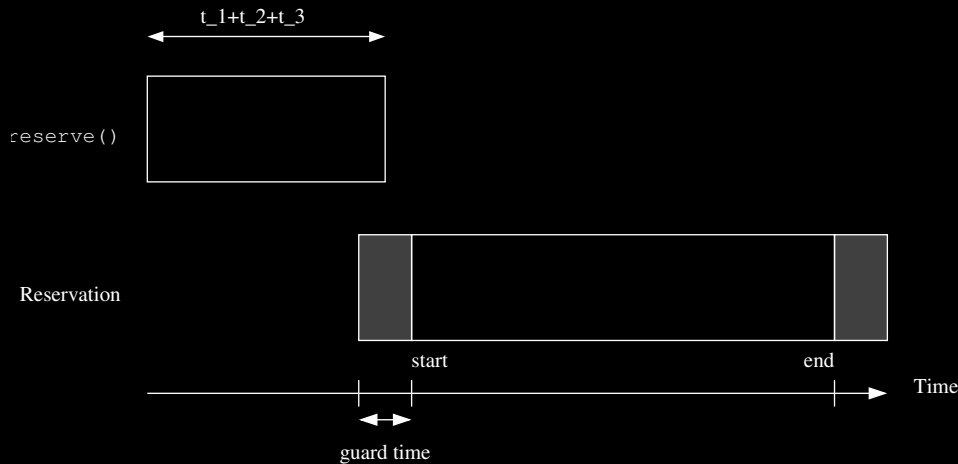
- On-demand: no start/end time, resource are allocated immediatly if possible.
- Immediate reservation: only end time is specified.
- Advance reservation: start time and end time are specified.
- Batch: request is queued and served when resources become available.

Which one do we want to support?

Guard Times

Time might be needed to perform operations:

- to schedule a request,
- to setup the resources,
- to release resources and make them available for new reservations. . .



Guard Times (cont'd)

Guard times might depend on NS, resource, load...

What to do?

- weaken the definitions of start time?
- have a minimum start time and publish it?
- or consider guard times as negligible?

Outline

- 1 Transactions & Temporal Constraints
- 2 Types of Request & Guard Times
- 3 Composition**

Composition

In addition to aggregation of segments into connections, NSI could propose:

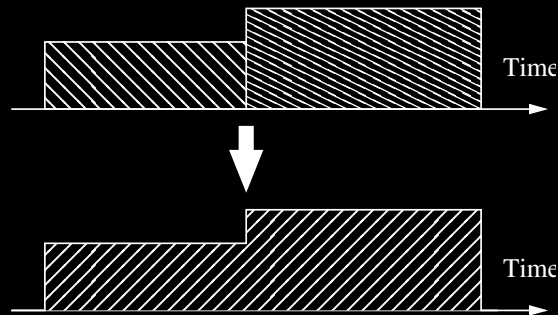
- Multistep: aggregation of connections with attributes and start/end time into a single connection with multistep profiles for the attributes
- Multipoint: aggregation of multipoint network segments and point to point segments into multipoint connection.

Multistep

Aggregation of resources to adapt time varying needs is probably not something that has to be solved by users. . .

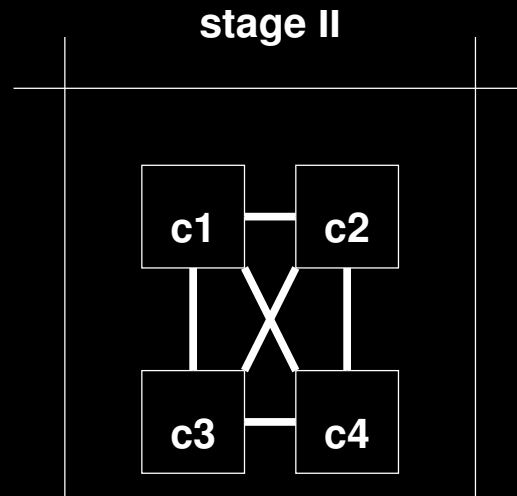
NS should provide this.

E.g. periodic needs, different bandwidth for day and night,...



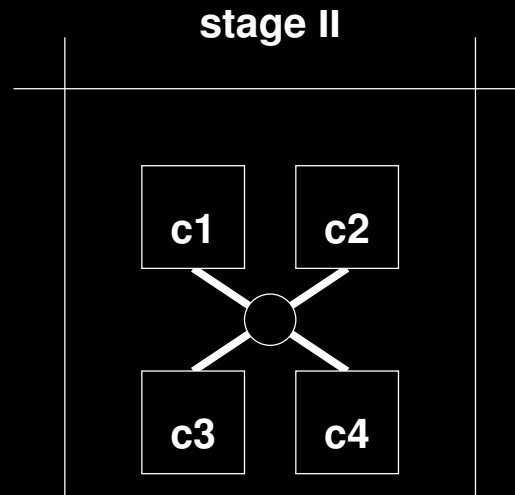
More than two endpoints

What if stage II was made of n sites? $n(n - 1)$ reservations? and routing would have to be done in the sites.



Multipoint

Could have multipoint (network) segments and multipoint connections:



Metro Ethernet Forum (MEF 10.1 document) defines such services: E-Line Service for point to point and E-LAN Service for multipoint to multipoint.

Multipoint (cont'd)

Link would remain a provider of point-to-point Segment.

Network would provide two type of resources: PTP Segments and MTM Segments.

Summary

Propositions:

- Types of request
- Time-constrained transactions for workflow
- Multistep reservation for time varying needs
- Multipoint Network segments and Connections for multipoint reservations.

Open issues:

- which additional states for the reservations?
- what to do with guard time? Publish minimum advance required for advance reservation and time need for instantiation?
- which kind of requests? (some can be optional)

Profiles and Operations

Types

Profile: list of $(start, value, end)$.

Requests: $(src, dst, \{minBw(profile), maxDelay(profile), \dots\})$

Operations

Basically the same: `reserve()/cancel()/modify()` except that `modify()` is a bit different: `modify($t_1, t_2, \{new\ profiles\}$)` replaces the old profiles by the new ones between t_1 and t_2 .

Profiles and Operations (cont'd)

