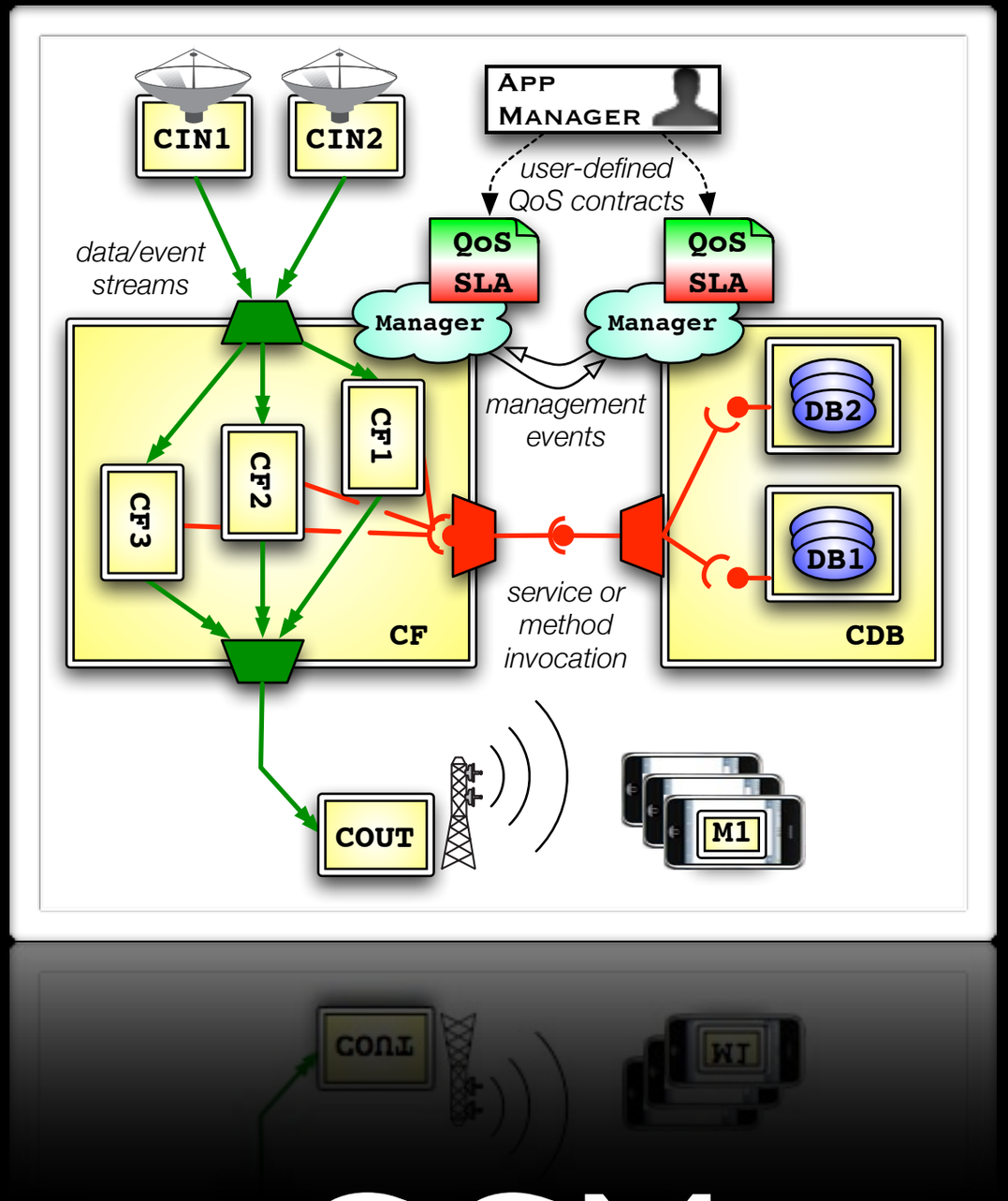
# CoreGRID
# Institute on Programming Model

## CoreGRID Industrial showcase
## Open Grid Forum

## Barcelona, Spain
## 4-5 June, 2008

# Programming Model

- **GCM**: a CoreGRID programming model and methodology
  - collecting partners experience
    - UNIPI, INRIA, WWU, UNIPASSAU, VUA, QUB, UPC, HRLS, ULisboa, USannio
  - component based, supporting autonomic computing
- STREP spin-off project: GridCOMP
  - GCM reference implementation demonstrate the feasibility and sustainability of the approach


# GCM (coreGrid Component

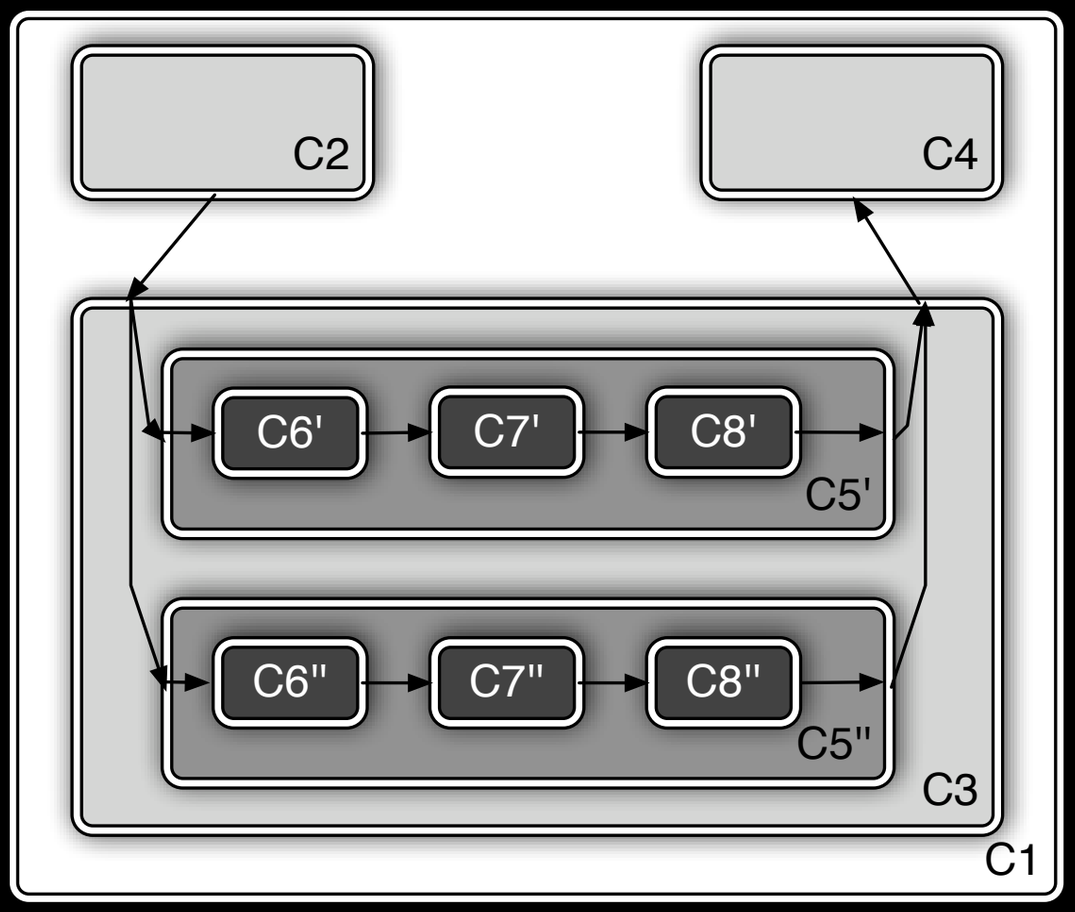
# GCM genesis and goals

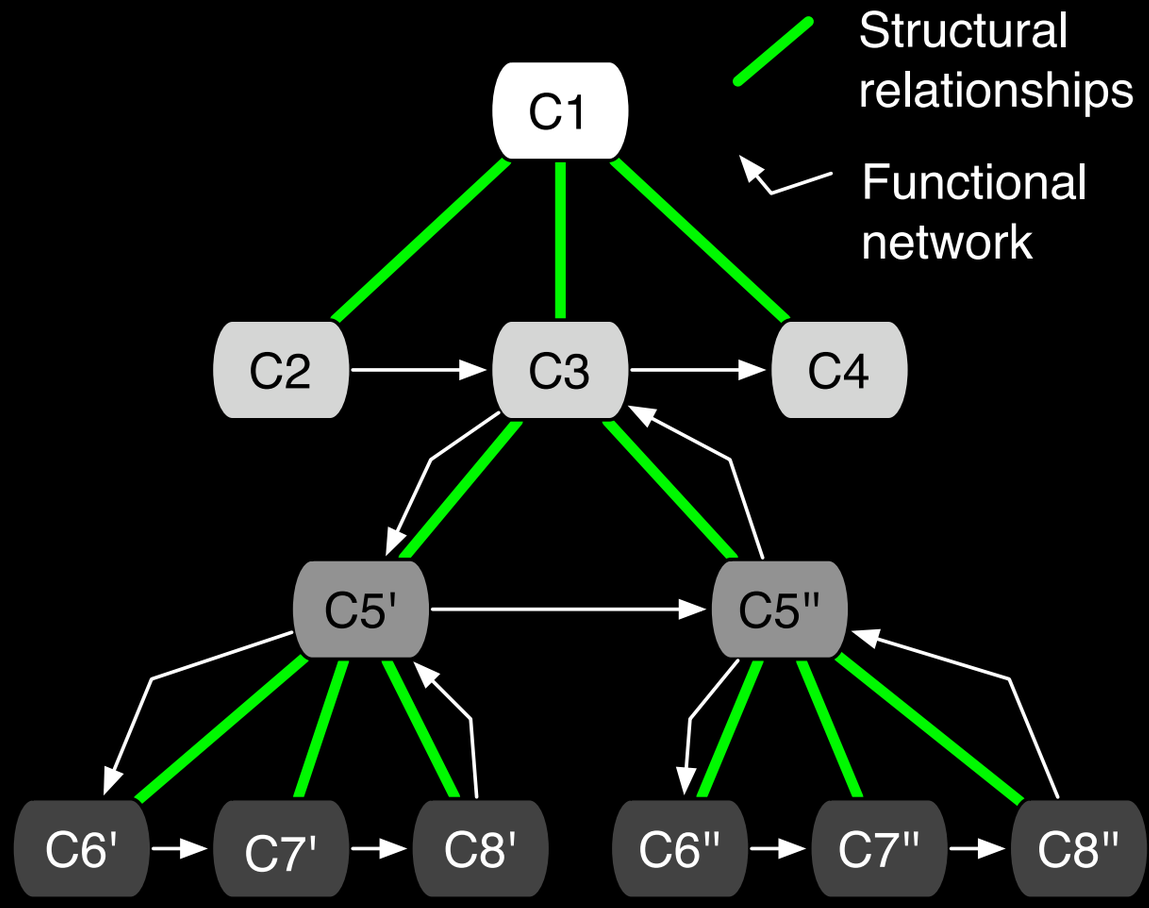
- Designed within CoreGRID NoE (6th FP)
  - Mainly within the Programming Model institute
  - Currently being developed within GridCOMP STREP (6th FP)
- Aimed at providing suitable tools for the efficient development of component based GRID applications.

# GCM features

- Hierarchical components
- Collective communications and component interaction patterns
- Autonomic management of notable parallel composite components
- Advanced programming models
- Fractal based


# Hierarchical components

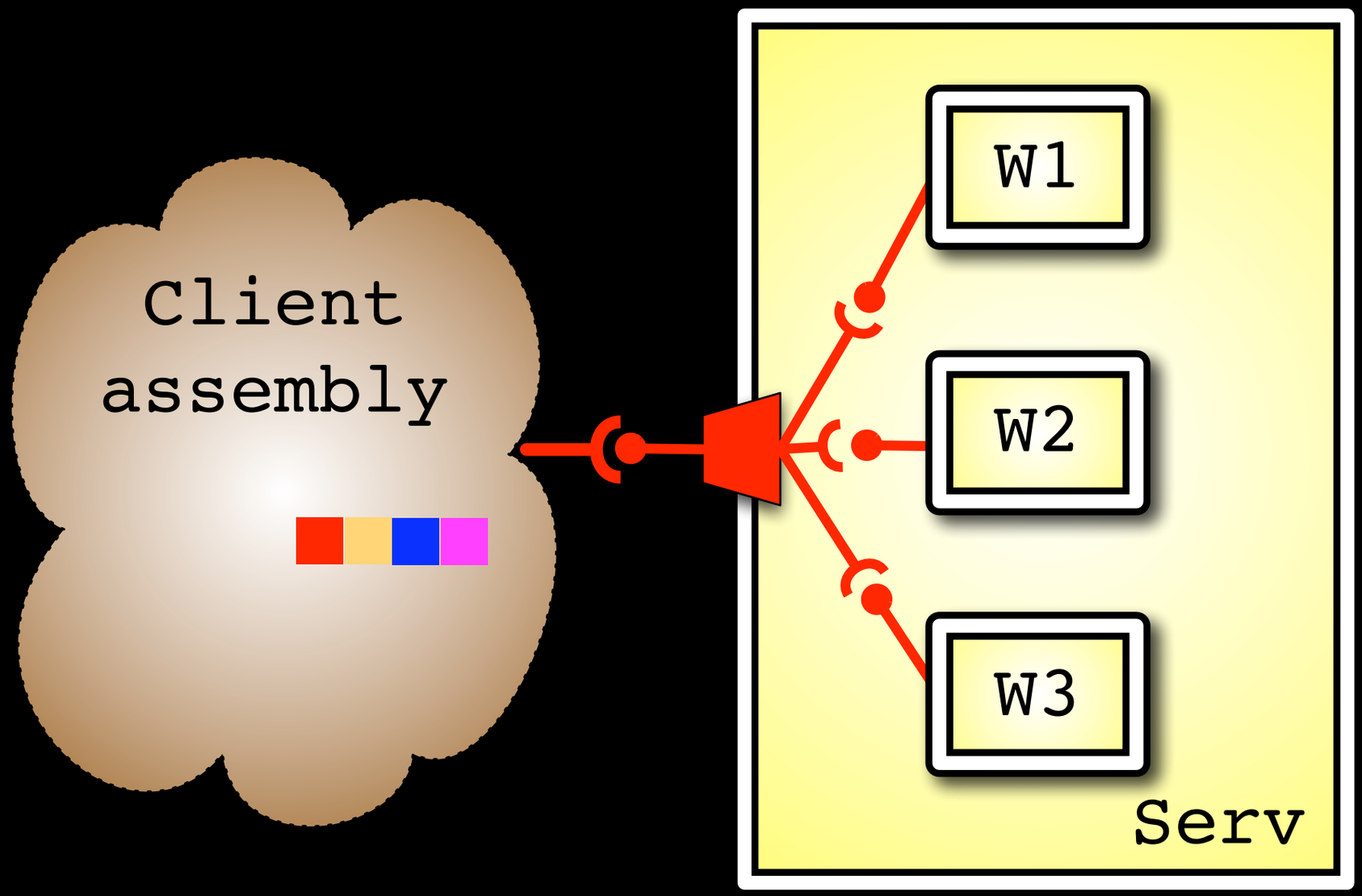


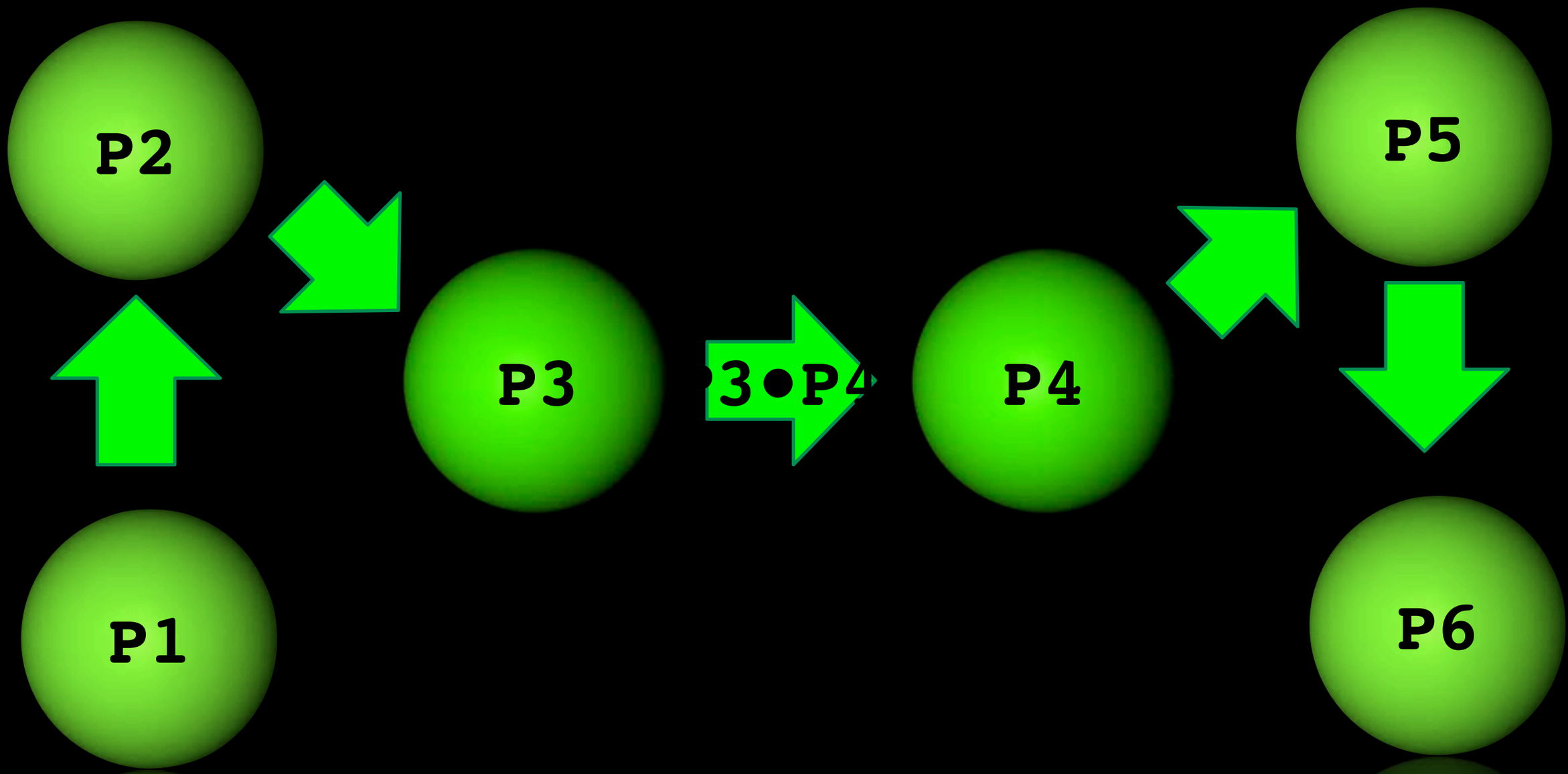




CoreGRID

GridCOMP

# Collective interaction






# Adaptivity

iTerm Shell Edit View Bookmarks Window Help (98%) mar 14:44

khast.isti.cnr.it

DISPOSITIVI
- Macintosh HD
- Windows HD
- iDisk
- 500Gb

CONDIVISI

POSIZIONI

CERCA

500Gb  Macintosh HD  Network  Windows HD

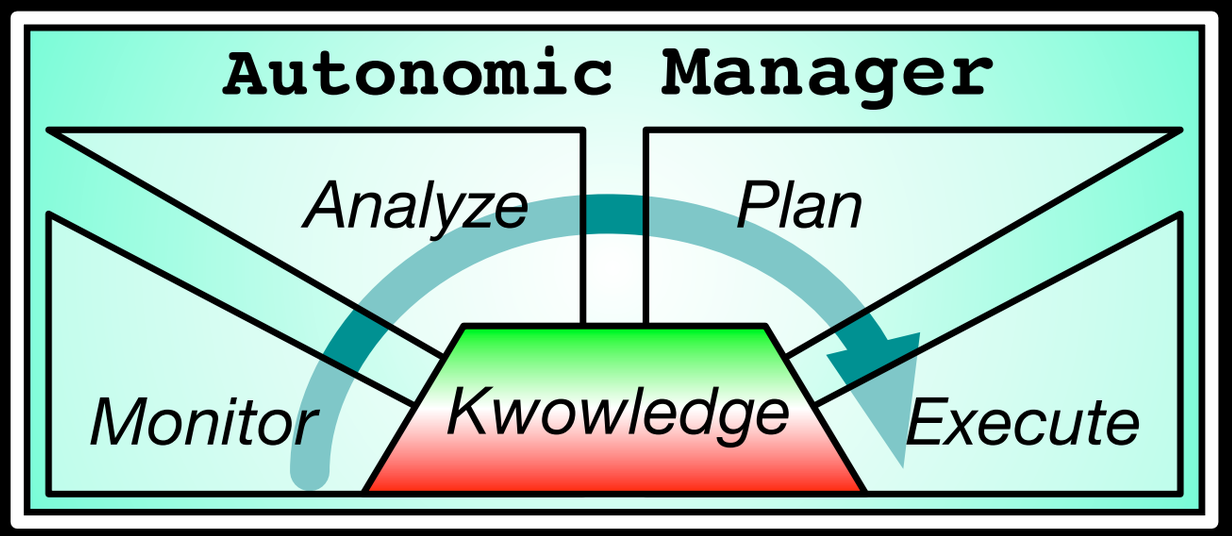
demo

New Info Customize Close Bookmarks

cannonau | khast

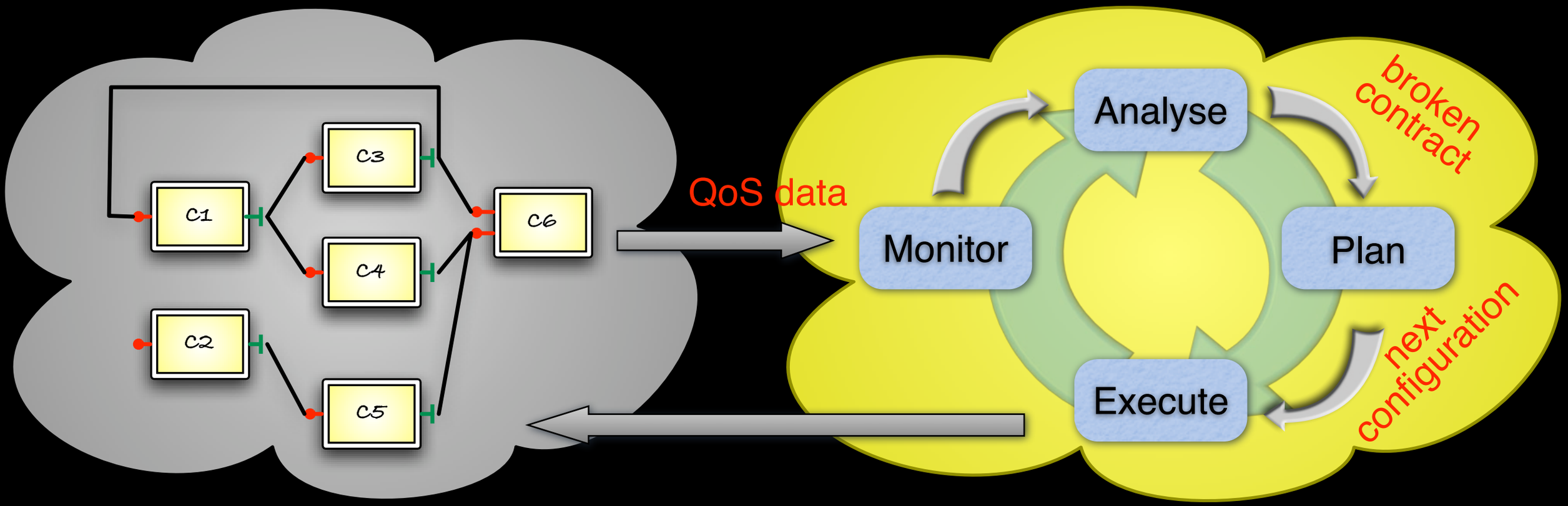
```
[khast@cannonau GridComp-Examples]$ ant mandelbrot-cannonau
```

4 elementi




# Autonomic management

# Autonomic Computing




## Managed components

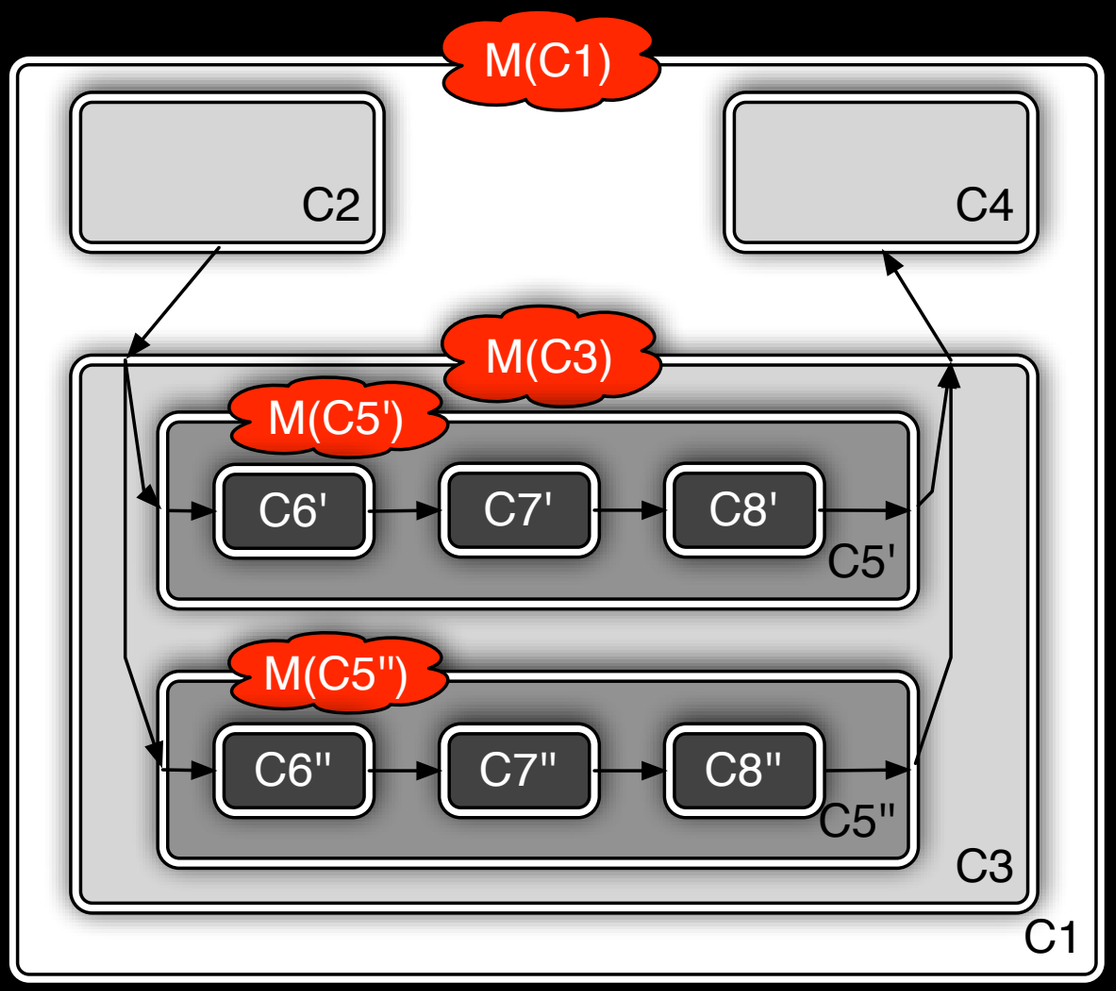
## Manager

- **monitor**: collect execution stats: machine load, service time, input/output queues lengths, ...
- **analyse**: instantiate performance models with monitored data, detect broken contract, in and in the case try to detect the cause of the problem
- **plan**: select a (predefined or user defined) strategy to re-convey the contract to validity. The strategy is actually a "program" using execute API

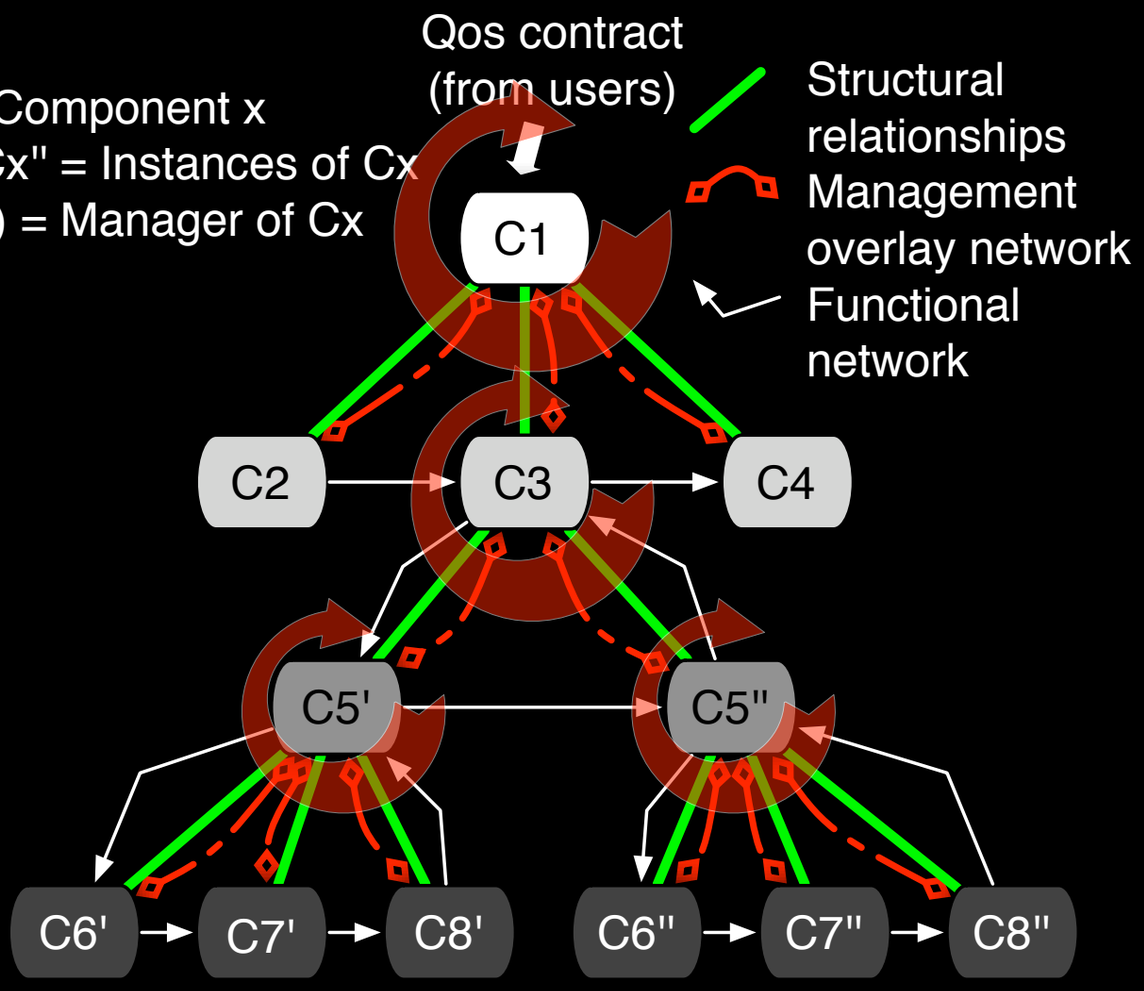
CoreGRID

GridCOMP

# Management Orchestration



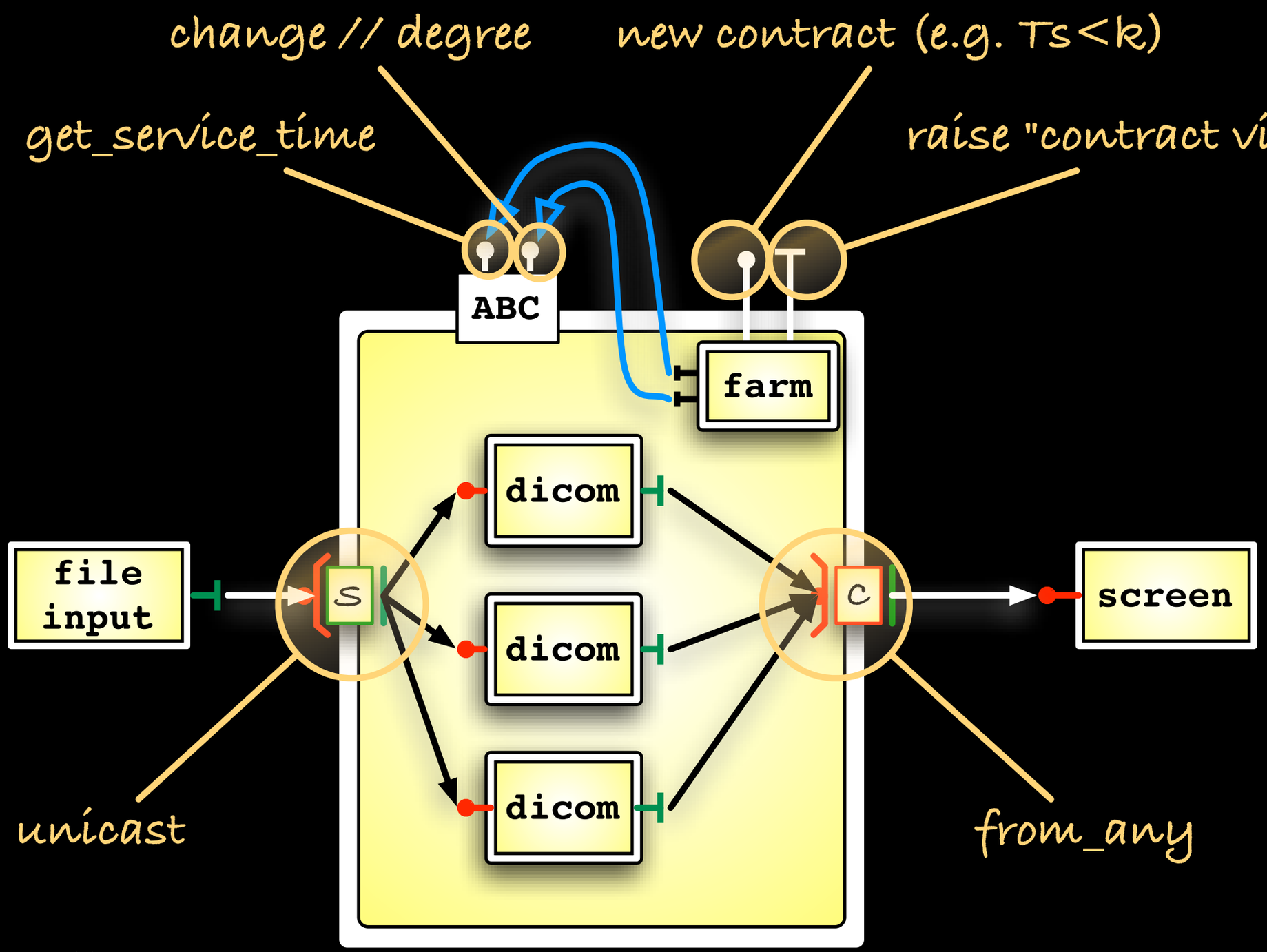

Cx = Component x
Cx', Cx" = Instances of Cx
M(Cx) = Manager of Cx



# Behavioural Skeletons

- Parametric assemblies of components
  - higher-order
  - equipped with a pre-defined adaptation API & management strategy
- Behavioural skeletons abstract component self-management in component-based design as design patterns abstract class design in classic OO development


# Farm (e.g. Dicom)




CoreGRID

GridCOMP

# Dicom Example

- Medical images analysis
  - perform several kind of image segmentation to highlight suspect spots in medical images
  - sequential code developed by Pisa university clinic
- Parallelised with GCM by just plugging the sequential code into a Behavioural Skeleton

demo

# Progress

*management policies*
*QoS contracts*
*manager engine*

*management co-ordination*
*mechanisms and policies*
*many open problems*

*monitoring API*
*reconfiguration API*
*passive BeSke*

*component model*
*methodology*
*programming tools*
*NF & F features*

*naming*
*communication*
*deployment*
*sharing*

middleware

component model features

adaptive components

autonomic components

autonomic applications

CoreGRID
kick-off 04

GridCOMP
kick-off 06

now

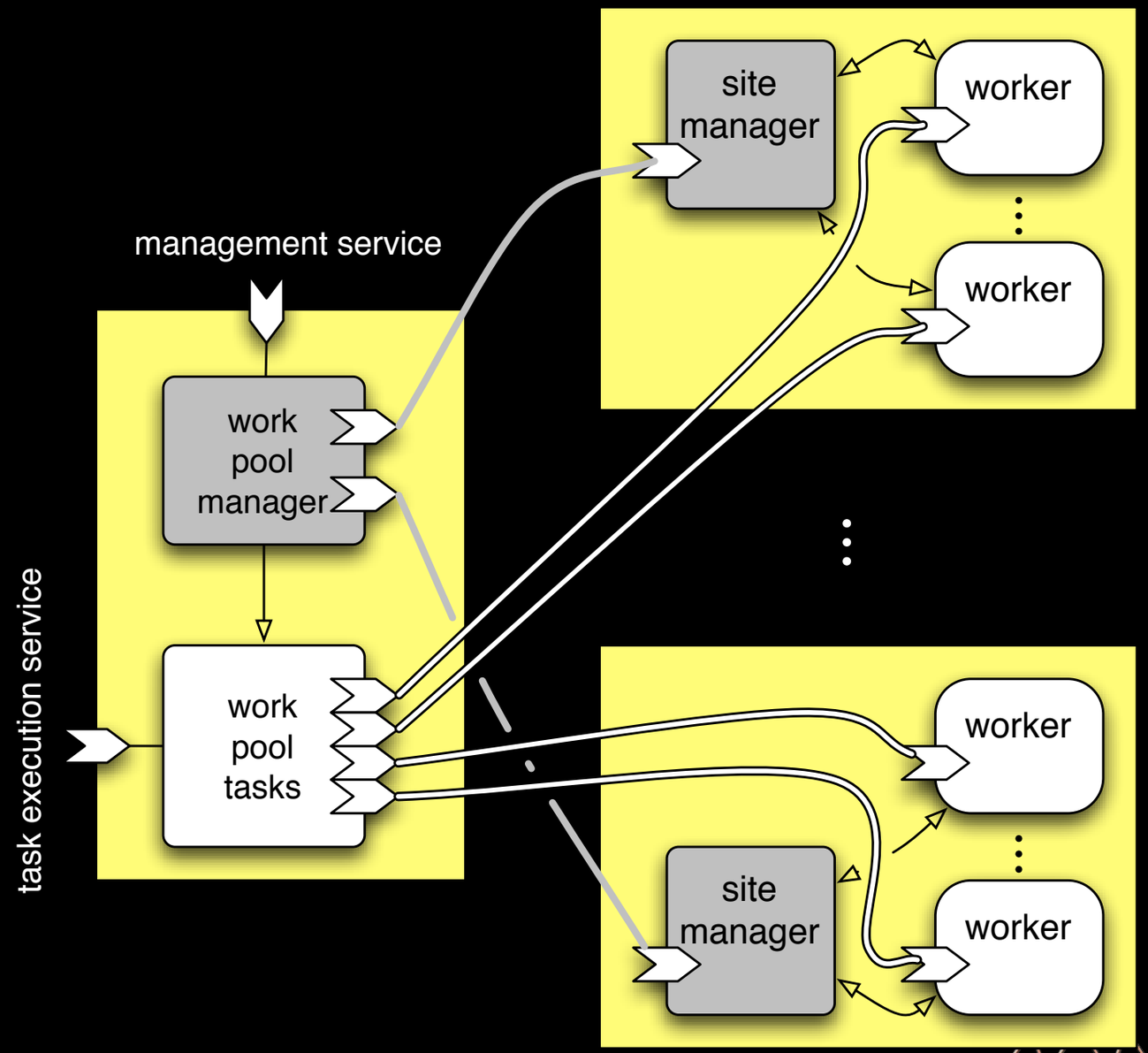
*area of interest*

# More demos
# on demand

# please ask us


# Component, services or both?

- We re-defined and implemented autonomic BeSke in SCA/Tuscany
  - proof-of-concept implementation
  - JBoss rule-based manager
- Few differences
  - manager: JBoss rules vs POJO code
  - protocols: standard XML/SOAP vs Proactive
  - binding: static vs dynamic
- Proposal for standard extension
  - dynamic binding of components
  - Tuscany people shown interest




CoreGRID

GridCOMP