Fault-Tolerance for PastryGrid Middleware

Christophe Cérin[1], Heithem Abbes[1,2], Mohamed Jemni[2], Yazid Missaoui[2]

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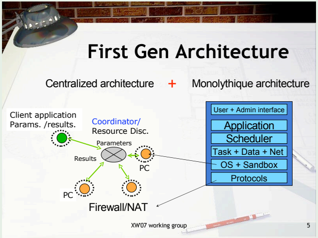
HPGC'10 - IPDPS

Outlines

Desktop Grid Architectures

Desktop Grid



Key Points

- Federation of thousand of nodes;
- Internet as the communication layer: no trust!
- Volatility; local IP; Firewall

Desktop Grid Architectures

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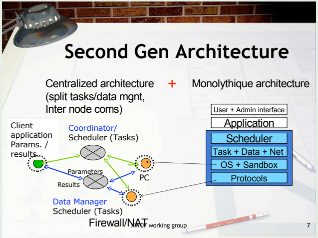

Future Generation (in 2006)

- Distributed Architecture
- Architecture with modularity: every component is "configurable": scheduler, storage, transport protocole
- Direct communications between peers;
- Security;
- Applications coming from any sciences (e-Science applications)

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PastryGrid

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- Decentralizes the execution of a distributed application with precedences between tasks

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Main objectives

- Fully distributed execution of task graph;

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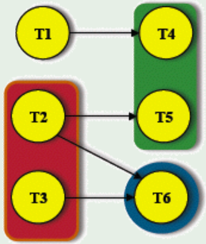
Example



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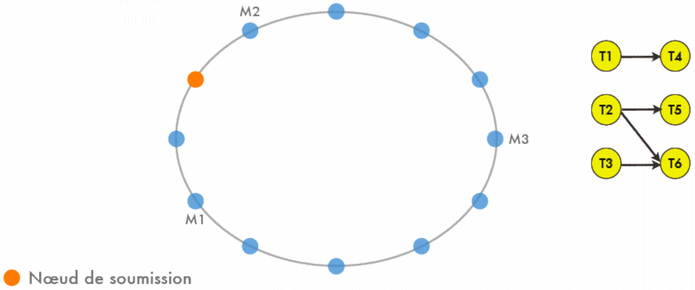

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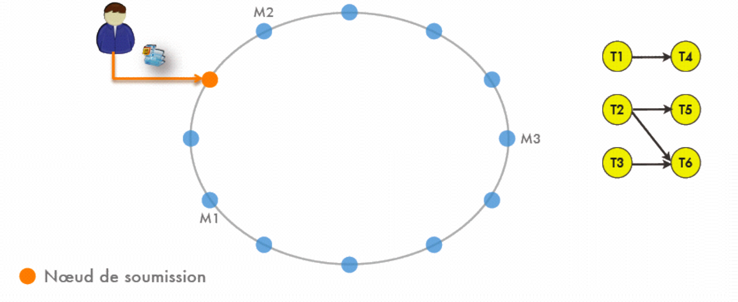

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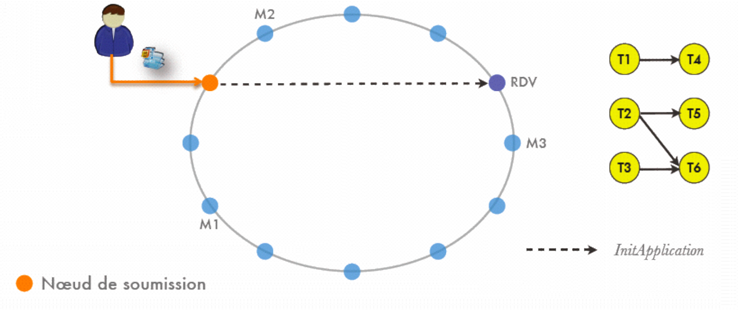

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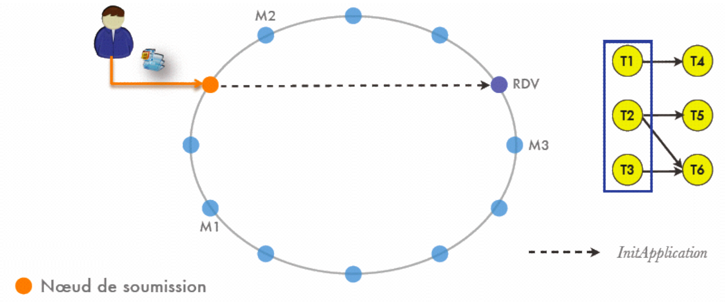

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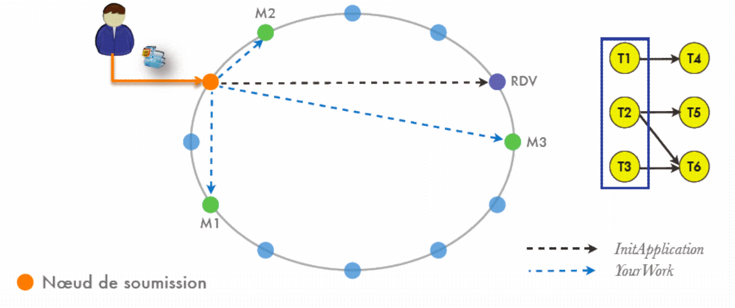

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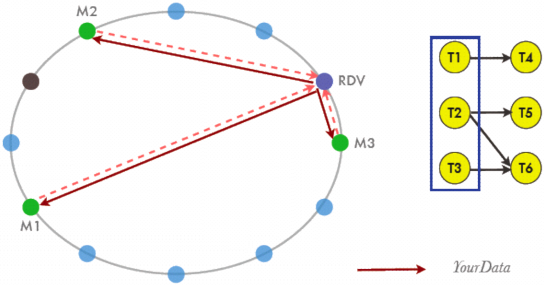

- Request and Data Recovery by M1, M2 and M3: DataRequest and YourData

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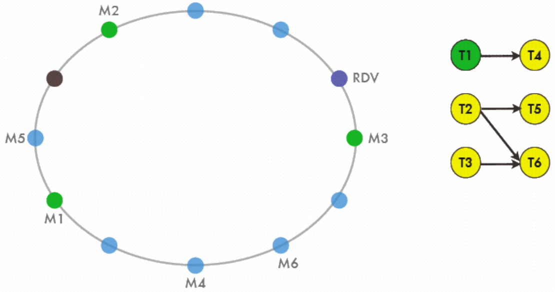

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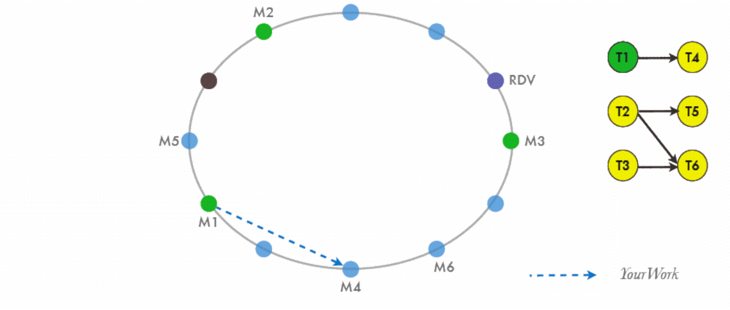

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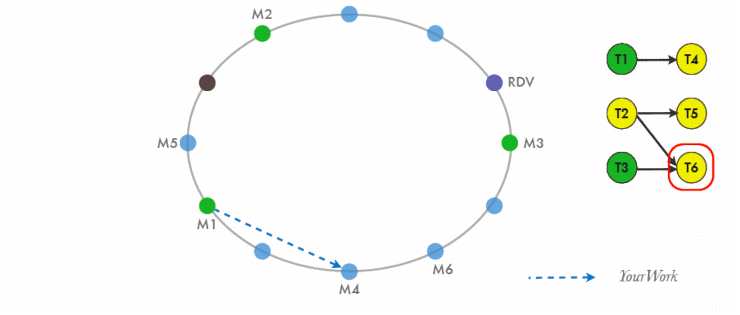

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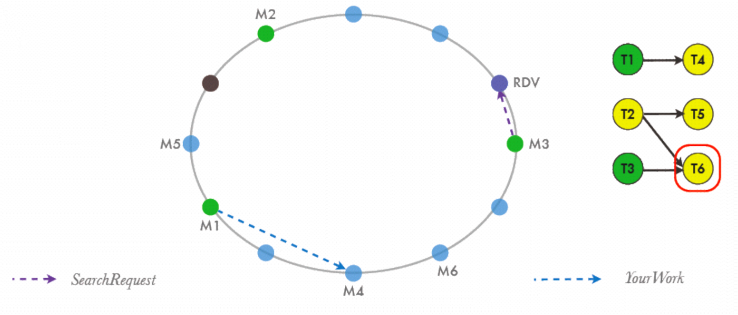

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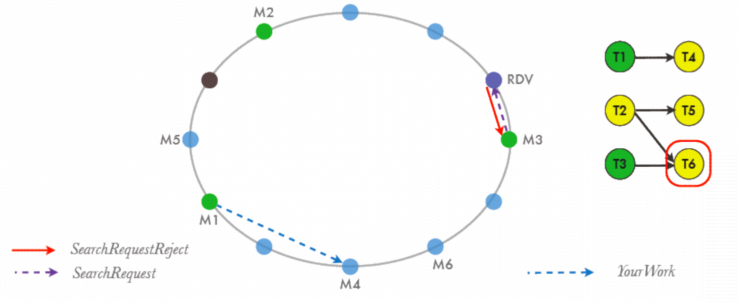

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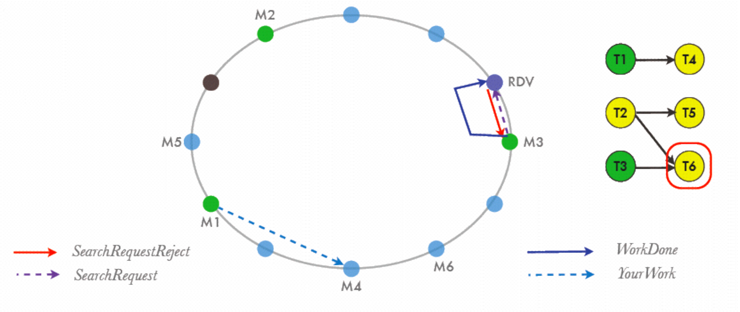

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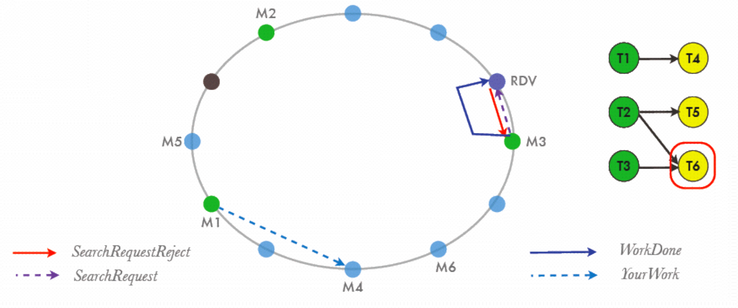

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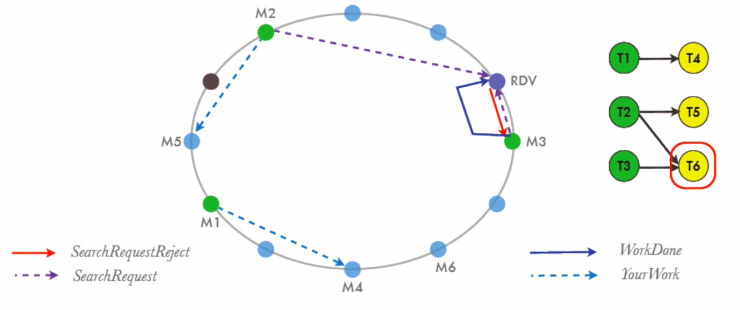

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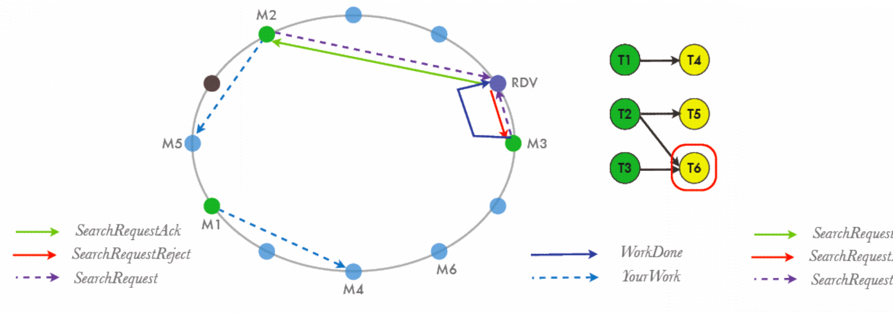

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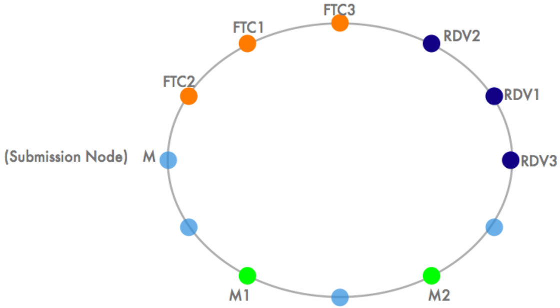

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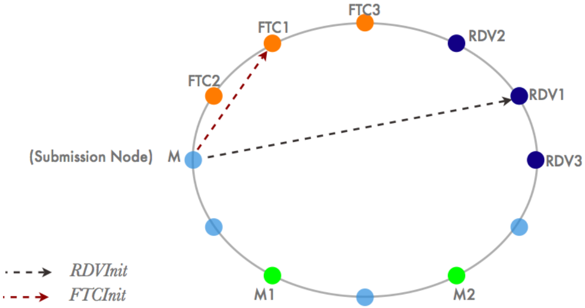

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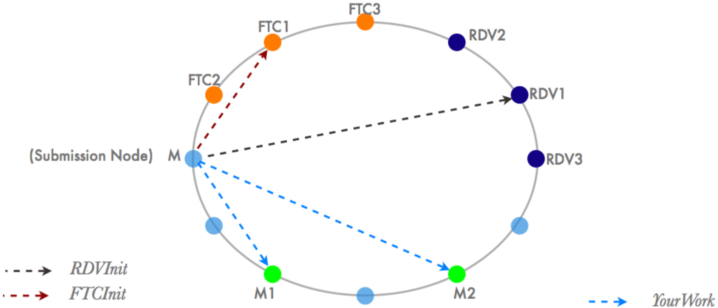

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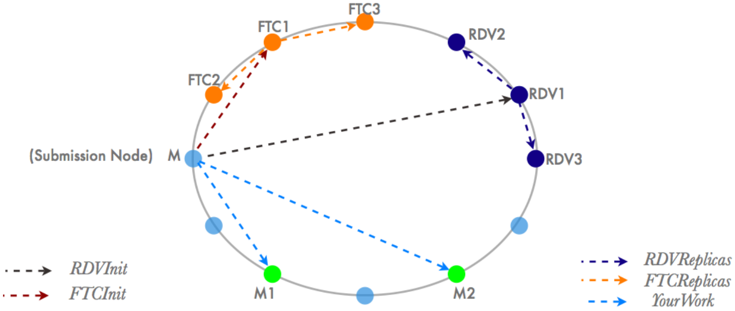

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- PAST creates k ($k = 2$) replicas RDV1, RDV2 for RDV and FTC1, FTC2 for FTC

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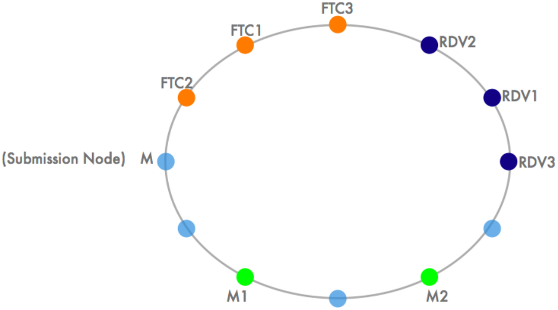

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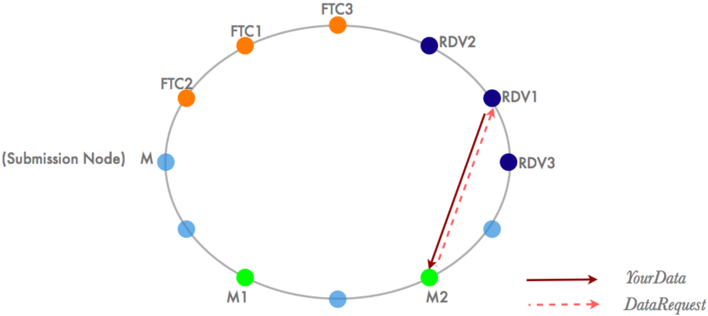

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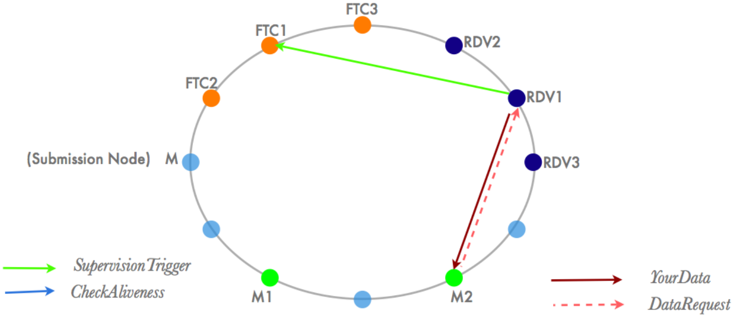

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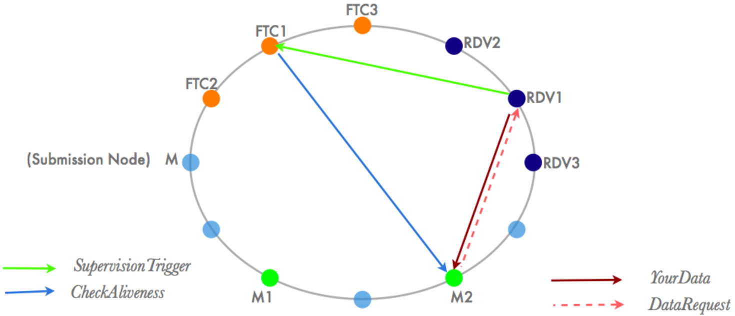

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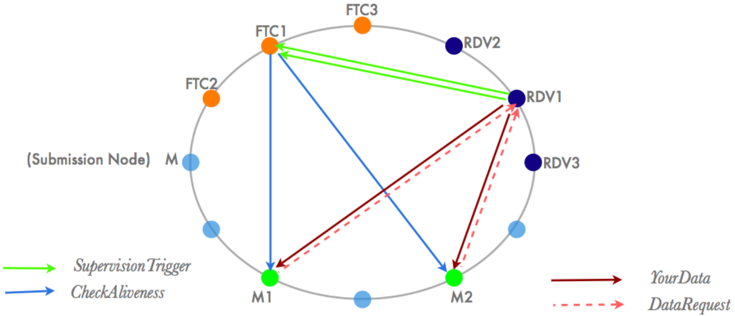

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- Main observations:
  - In all cases, PastryGrid terminates;
  - The recovery time depends on the node type;
  - The delay varies from 4:53s to 7:16:41s... but it works! The number of delayed applications varies from 44 to 98.

	Prob. in %	Execution time (s)	#Failed nodes	#Delayed applications	#FTC nodes	# RDV nodes
Scenario 1	20	2h, 13mn and 2secs	66	44	2	2
Scenario 2	50	3h, 22mn and 27secs	198	58	8	7
Scenario 3	80	9h, 24mn and 49secs	583	98	12	14

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