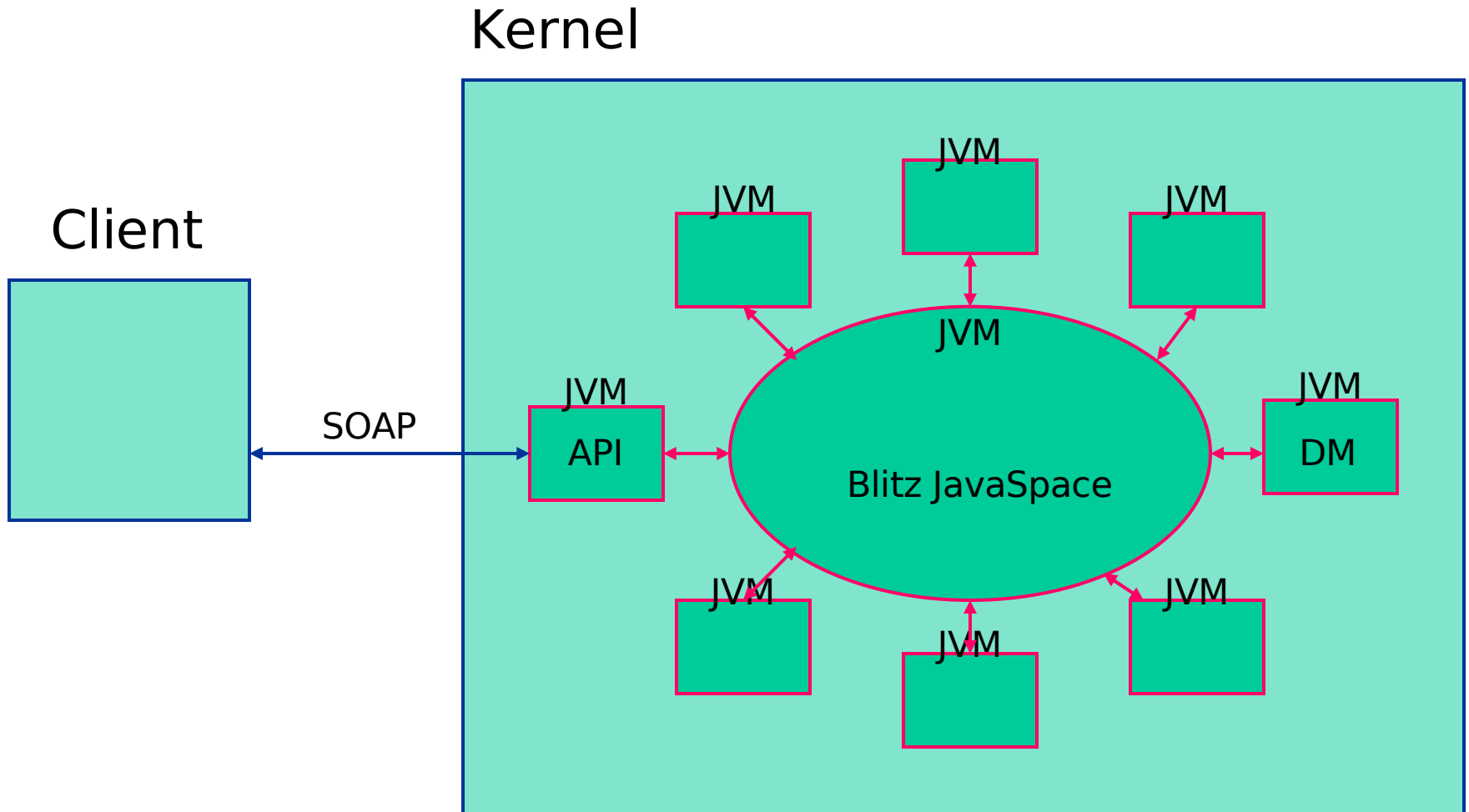


# The 2nd TripCom Prototype

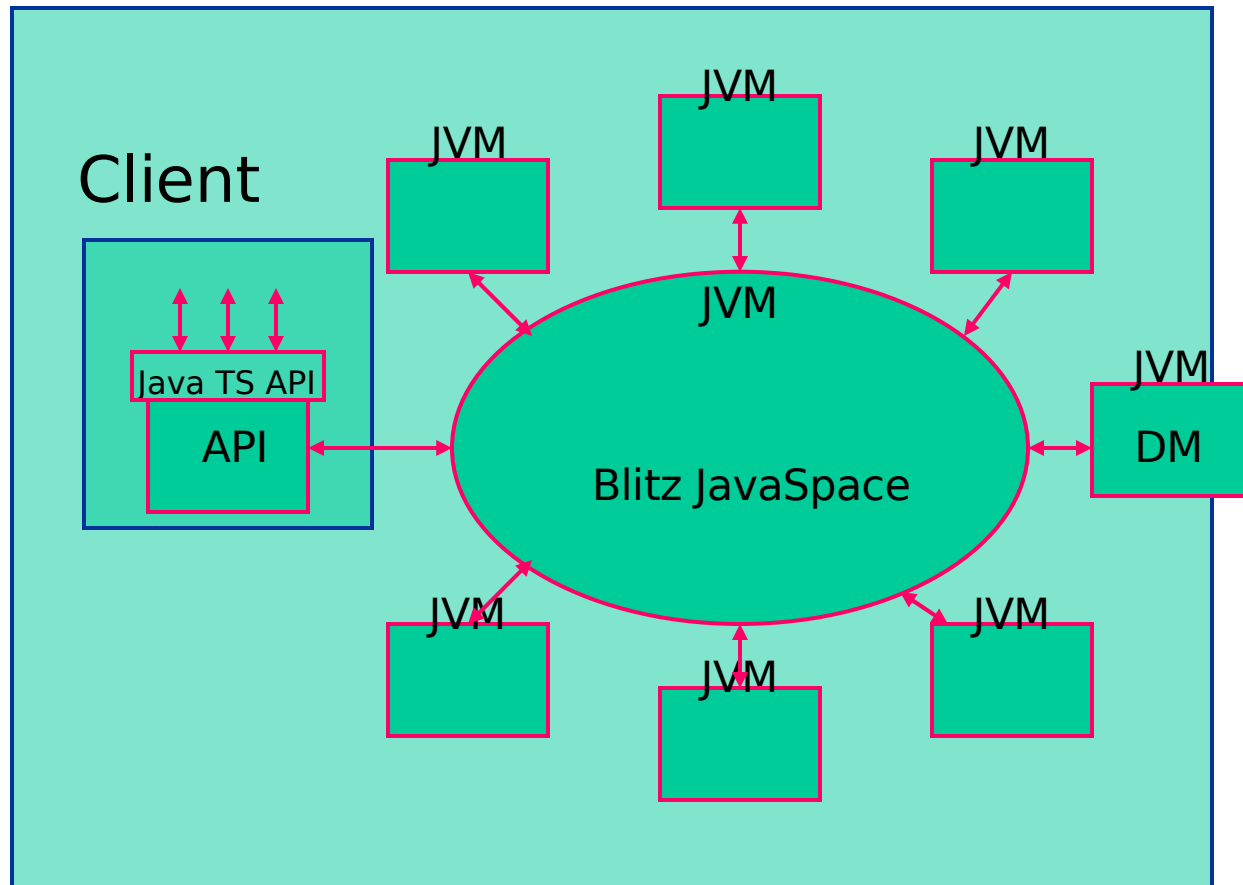
**TripCom GA Galway  
28 Apr 2008**

- Single kernel
  - manages one space, no distribution of spaces
- Components
  - TS API
  - Triple store adapter
  - Security manager
  - Metadata manager
  - Distribution manager
  - Transaction manager
  - WS registry

- Kernel-client interaction
  - local: Java TS API
  - remote: SOAP
- Multiple clients
  - simulated through threads
  - all clients use same instance of API component
- Anonymous clients
  - default policy of security manager: default policy)
- Multiple kernels
  - forwarding of requests to different kernel (rd with URL)
  - distribution manager connects to remote kernel
    - acts as a TS client



## Kernel



- OutMultipleTest
  - testOutMultiple01(): writes ten triples into the space and tries to read afterwards
  - testOutMultiple02(): same as above but read in a loop
  - 3.711 sec
  - 100% success

## ■ RdTest

- testRdWithSpaceURL01(): tries to read an entry from the space
- testRdWithoutSpaceURL01(): same as above, without space URL
- testRdWithSpaceURL02(): continuously tries to read an entry from the space
- testRdWithoutSpaceURL02(): same as above, without space URL
- 74.679 sec
- 2 Errors (50% success)

## ■ BlockingRdTest

- testBlockingRd01(): blocking *rd* on the space and check whether it returns after a matching entry has been written
- 40.036 sec
- 1 Failure

## ■ InTest

- testIn01(): tries to take all triples from a space and checks if the space is empty afterwards
- testIn02(): takes one entry from a space
- testIn03(): takes all entries from a space
- 1.093 sec
- 3 Errors

## ■ InMultipleTest

- testInMultiple01(): tests if *inmultiple* returns all 10 triples from a space
- 0.549 sec
- 1 Error



## ■ SubspaceTest

- testOutAndRdFromSubSpace01(): writes a triple into a subspace and tries to read it afterwards
- testOutAndRdFromSubspace02(): writes entries into different subspaces and tries to read them afterwards
- 1.22 sec
- 2 Failures

## ■ SubscriptionTest

- testSubscribe01(): creates a subscription and checks if the returned URI is not null
- 0.059 sec
- 1 Failure

- Machine specs: Dual core 1.8 GHz, 2 GB RAM, Linux (Suse 10.3)
- Clients run concurrently, write triples into the space
  - Subject:  
*<http://example.com/books/book<client\_number>*
  - Predicate:  
*<http://purl.org/dc/elements/1.1/title>*
  - Object:  
*"HarryPotter<client\_number>\_<iteration>"*

Clients	Iterations	Duration	Real duration	Avg
1	100	4355	0:37	43.28
2	100	5203	1:12	51.04
4	50	3664	1:18	65.75
8	25	4871	1:22	184.44
32	10	6179	2:08	549.09

- last case produced 66 errors:

```
INFO "out: got OutErrorResult: This is the ErrorResultExternal, if no ResultExternal could
fished out of the bus" [Tools$OutResponseThread(564), wait-for-out-response-thread
12091437030765]
```

```
ERROR "TakeOutResultThread: java.lang.RuntimeException: out: got following ErrorResult
message from TS: This is the ErrorResultExternal, if no ResultExternal could fished out
of the bus" [Tools$OutResponseThread(588), wait-for-out-response-thread 12091437030765]
```

- all triples were successfully written to the space though

- Space contains 100 triples:
  - Subject: `<http://example.com/books/book0>`
  - Predicate:  
`<http://purl.org/dc/elements/1.1/title>`
  - Object:  
`"HarryPotter0_<0-99>"`
- Clients concurrently read a triple from the space
- Query:
  - `CONSTRUCT { $book $title "HarryPotter<0-99>" } WHERE { $book $title "HarryPotter<0-99>" }`

Clients	Iterations	Duration	Average
1	100	51211	511.98
2	50	20192	401.19
4	25	12949	506.75
32	10	-	-

## ■ Last case throws many exceptions of kind:

```
Exception in thread "Thread-34" java.lang.RuntimeException: rd/in: got following
  ErrorResult message from TS: This is the ErrorResultExternal, if no ResultExternal
  could fished out of the bus
    at org.tripcom.api.execution.Tools.readInMultiple(Tools.java:280)
    at
  org.tripcom.api.execution.CoreAPIImplementation.rd(CoreAPIImplementation.java:89)
    at org.tripcom.test.performance.RdOperation.performOperation(RdOperation.java:33)
    at org.tripcom.test.performance.Client.run(Client.java:26)
    at java.lang.Thread.run(Thread.java:595)
```

- A “real” graph
  - sketch ontology from the biopathways consortium
  - <http://www.w3.org/2000/10/swap/test/pathway/pathway.rdf>
- duration: 17seconds
- Internal duration: 13:32 min
- OutOfMemory errors
- 6300 triples successfully outed
- rdmultiple of this graph takes 4393ms

- Reading sometimes produces an exception:

```
ERROR [class org.tripcom.tsadapter.TSAdapterEntryHandler]
```

```
(TSAdapterEntryHandler.java:43) - Operation class  
org.tripcom.tsadapter.TSAdapterEntryHandler failed!
```

```
java.lang.NullPointerException
```

```
at
```

```
org.tripcom.tsadapter.TSAdapterEntryHandler.writeToORDI(TSAdapterEntryHan  
dler.java:60)
```

```
at
```

```
org.tripcom.tsadapter.TSAdapterEntryHandler.run(TSAdapterEntryHandler.java:  
39)
```

```
at java.lang.Thread.run(Thread.java:595)
```

```
INFO [class org.tripcom.tsadapter.TSAdapterEntryHandler]
```

```
(TSAdapterEntryHandler.java:45) - Operation class  
org.tripcom.tsadapter.TSAdapterEntryHandler stopped!
```

- Afterwards rd still works, but out doesn't
  - no error message but triples aren't written

- SPARQL queries of kind *SELECT \* WHERE {?s ?p "HarryPotter"}*

```
ERROR [class org.tripcom.tsadapter.RdTSAdapterEntryHandler]
(RdTSAdapterEntryHandler.java:58) - Operation class
org.tripcom.tsadapter.RdTSAdapterEntryHandler failed!
java.lang.NullPointerException
    at org.tripcom.tsadapter.SPARQLExecutor.execute(SPARQLExecutor.java:78)
    at
org.tripcom.tsadapter.RdTSAdapterEntryHandler.executeRdTSAdapterEntry(RdTSAdapterEntryH
andler.java:74)
    at
org.tripcom.tsadapter.RdTSAdapterEntryHandler.run(RdTSAdapterEntryHandler.java:53)
    at java.lang.Thread.run(Thread.java:595)
INFO [class org.tripcom.tsadapter.RdTSAdapterEntryHandler]
(RdTSAdapterEntryHandler.java:60) - Operation class
org.tripcom.tsadapter.RdTSAdapterEntryHandler stopped!
```

- work around

```
CONSTRUCT { $s $p "HarryPotter" } WHERE { $book
$title "HarryPotter" }
```



- If many triples are written over a short period, **OutOfMemory errors (may) occur**

Exception in thread "main" java.lang.OutOfMemoryError: unable to create new native thread

```
at java.lang.Thread.start0(Native Method)
at java.lang.Thread.start(Thread.java:574)
at org.tripcom.api.execution.WriteToBusThread.<init>(WriteToBusThread.java:61)
at org.tripcom.api.execution.WriteToBusThread.<init>(WriteToBusThread.java:48)
at org.tripcom.api.execution.Tools.out(Tools.java:178)
at org.tripcom.api.execution.CoreAPIImplementation.out(CoreAPIImplementation.java:79)
at org.tripcom.test.TsApiTester.startTest(TsApiTester.java:40)
at org.tripcom.test.Main.main(Main.java:38)
```

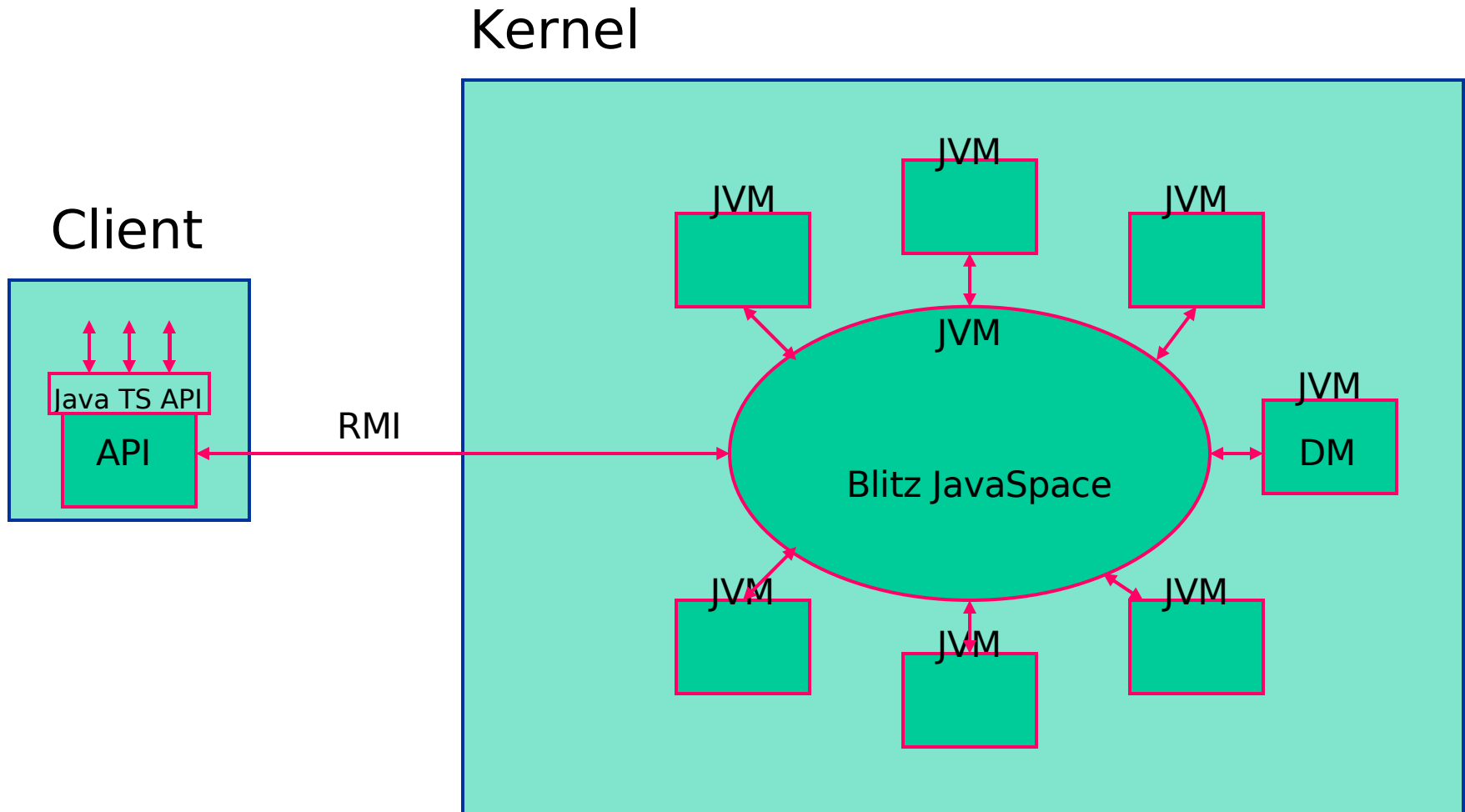
Exception in thread "wait-for-out-response-thread 12092054297456"

```
java.lang.OutOfMemoryError: unable to create new native thread
at java.lang.Thread.start0(Native Method)
at java.lang.Thread.start(Thread.java:574)
at org.tripcom.api.execution.TakeResultThread.<init>(TakeResultThread.java:59)
at org.tripcom.api.execution.Tools$OutResponseThread.run(Tools.java:529)
```

- In particular if multiple clients/threads write triples concurrently
- API component creates a new thread per each request
  - thread pool ...

- via Java TS API
  - typed interface
  - remote access to JavaSpace
    - security issues
  - client within kernel
    - for development only
- via SOAP
  - directly: TS application must build SOAP messages
  - required: client API package
    - client interacts with Java TS interface
    - wrapper from/to SOAP

# Kernel – Client Interaction



# Kernel – Client Interaction

