JGroups: Multicast Messaging
Introduction to Middleware

Vojtěch Horký    Petr Tůma

Department of Distributed and Dependable Systems
Faculty of Mathematics and Physics
Charles University

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Outline

1. Technology Overview
2. Assignment Part I
3. Interface Overview
4. Assignment Part II
## Technology Overview

### Goals
Provide reliable group messaging mechanism.

### Features
- Basic group messaging interface.
- Groups identified by names.
- Messages are byte arrays.
- Configurable protocol stack.
  - Multiple underlying transports.
  - Multiple reliability mechanisms.
  - Multiple membership discovery mechanisms.
  - Multiple error recovery mechanisms.
  - ...

... http://www.jgroups.org
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Assignment

Peer

Implement a process that will update a shared hash map.
- The shared hash map is available through SharedHashMap channel.
- The updates are transmitted through UpdateEvent class.

```java
import java.io.Serializable;

public class UpdateEvent implements Serializable {
    private static final long serialVersionUID = 0xBAADBAADBAADL;

    public int key;
    public String value;
}
```
Examples To Begin With ...

> git clone http://github.com/d-iii-s/teaching-introduction-middleware.git

Java

> cd teaching-introduction-middleware/src/jgroups-basic-peer/java
> cat README.md
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JChannel Class

```java
public class JChannel implements Closeable {
    public JChannel ();
    public JChannel (String properties);
    public JChannel (InputStream configuration);

    public JChannel connect (String cluster_name);
    public JChannel disconnect ();

    public JChannel send (Message msg);
    public JChannel send (Address dst, Object obj);
    public JChannel send (Address dst, byte [] buf);

    public JChannel setReceiver (Receiver r);
    public Receiver getReceiver ();

    public View getView ();

    public JChannel addChannelListener (ChannelListener listener);
    public JChannel removeChannelListener (ChannelListener listener);

    ...
}
```
public interface Message {
    public Address getDest ();
    public Message setDest (Address new_dest);
    public Address getSrc ();
    public Message setSrc (Address new_src);
    ...
}

public class BytesMessage implements Message {
    public BytesMessage ();
    public BytesMessage (Address dest);
    public BytesMessage (Address dest, byte [] array);
    public BytesMessage (Address dest, byte [] array, int offset, int length);

    public int getOffset ();
    public int getLength ();
    public byte [] getArray ();
    public BytesMessage setArray (byte [] b, int offset, int length);

    ...
}
public class ObjectMessage implements Message {
    public ObjectMessage ();
    public ObjectMessage (Address dest);
    public ObjectMessage (Address dest, Object obj);

    public <T extends Object> T getObject ();
    public ObjectMessage setObject (Object obj);

    ...
}
public interface Receiver {
    default void receive (Message msg);
    default void receive (MessageBatch batch);

    default void viewAccepted (View new_view);

    default void block ();
    default void unblock ();

    default void setState (InputStream input);
    default void getState (OutputStream output);
}
public interface ChannelListener {
    public void channelClosed (JChannel channel);
    public void channelConnected (JChannel channel);
    public void channelDisconnected (JChannel channel);
}
Code Now ...

OK so I think this card is done... let's check it against the checklist.

Check technical specs... OK

Design and code unit tests... OK

Update the build config... OK

Set up new permissions... OK

Update API docs and readme... OK

It looks like we've done everything... but it feels like I'm forgetting something...

Oh yeah! Just one small detail...

...I need to code it

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Assignment

Peer

Implement a process that will track and display a shared hash map state.

- The shared hash map is available through SharedHashMap channel.
- The updates are transmitted through UpdateEvent class.

```java
import java.io.Serializable;

public class UpdateEvent implements Serializable {
    private static final long serialVersionUID = 0xBAADBAADBAADL;

    public int key;
    public String value;
}
```

Quiz

- How would you go about measuring the cluster throughput?
- Will the entire cluster see the same state?
Submission

GitLab


Requirements

- Use the assignment subdirectory.
- Write brief report in SOLUTION.md.
- Include build scripts with instructions.
- Do not commit binaries or temporary build artifacts.