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Incorporating Media into Java™ and JavaFX™ Technology Based Platforms

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Learn about the Java Media APIs and how to incorporate audio and video into your JavaFX™ Script or Java™ technology based applications

GOAL

Agenda

- **Motivation**
- **Design Goals and Constraints**
- **Architectural Overview**
- **Formats, CODECs, and platform support**
- **Demos and Code Samples**
- **Road Map**
- **Questions and Answers**

Motivation

- Video has become ubiquitous on the web
- Java technology lacks basic media functionality
- Needs to work 'out of the box'
 - No further downloads, click throughs, etc...

Design Goals

- Media Playback is of primary importance
- Simple API: only a few lines of coded needed
- Cross platform A/V format required
- Native support also desirable
 - “Mash ups”
 - Viewing local media
- Zero Configuration plug in support
 - Drop in format support
- Going beyond rectangular video
 - Support lightweight rendering
 - Integration with Scenegraph, FXScript, and 3D APIs

Design Goals (continued)

- **Bundle with the Java Runtime Environment (JRE) software**
 - Ease of deployment
 - Small footprint (< 300K)
- **Incorporating per-unit royalty bearing technologies not feasible**

Formats, Codecs, and Platform Support

- **Cross Platform Video Format Support**
 - Encode once, play anywhere
 - Licensed Codec technology from On2 Technologies
 - Over time, multiple formats may be supported
 - Sun Open Media Stack (OMS)
 - Xiph Media (Theora, Vorbis)
- **Leveraging the Native Platform**
 - Windows
 - Play Windows Media via DirectShow
 - Flash via the ActiveX Control
 - Mac
 - CoreAudio and CoreVideo
 - Linux and Solaris
 - GStreamer

Architectural Overview, JMC

➤ Java Media Components

- **JMediaPlayer**
 - A JComponent that provides media playback with user interface controls
- **JMediaPane**
 - A JComponent that provided media playback without UI controls
- **MediaProvider**
 - Low level media player that can render into a graphics object or pass raw data into other rendering systems
- **Media Class**
 - For getting information about the media
 - Tracks: Audio Video and Subtitles currently supported
 - Duration, size, etc...
 - Metadata: generic interfaces for retrieving more than strings.
- Events and Exceptions

Code Sample: Simple Player

```
class SimplePlayerDemo extends JFrame {
    MediaPlayerDemo() {
        JMediaPlayer mp;
        try {
            mp = new JMediaPlayer(new URI("movie.mov"));
        } catch (Exception e) {
            System.out.println("Error opening media" + e);
            ...
        }
        add(mp);

        pack();
        setVisible(true);

        mp.play();
    } ...
}
```

Simple Player Demo

▶ DEMO

Code Sample: Custom Controls

```
public class CustomControlsDemo extends JFrame implements
    ActionListener, ChangeListener {
    private JMediaPane mp;

    public CustomControlsDemo (URI uri) {
        mp = new JMediaPane (uri);

        JPanel cp = createControlPanel ();

        getContentPane ().add (mp, BorderLayout.CENTER);
        getContentPane ().add (cp, BorderLayout.SOUTH);

        pack ();
        setVisible (true);
    } ...
```

Code Sample: Custom Controls (cont'd)

```
private void createControlPanel() {
    playButton = new JButton("Play");
    playButton.addActionListener(this);
    ...
    progressSlider = new JSlider(JSlider.HORIZONTAL, 0,
                                1000, 0);
    progressSlider.addChangeListener(this);
    ...
}

private void play() {
    if (mp != null) {
        mp.play();
    }
    ...
}
```

Java API notes

- **JMediaPlayer, JMediaPane, and MediaProvider contain typical methods for media playback:**
 - Play, pause, setRate, setRepeating, setVolume, setSource etc.
 - Player and media are separate objects, rather than having play methods on the media.
 - Better Beans/Swing/NetBeans™ software integration
 - More efficient use of objects in typical scenarios

Player with Custom Controls



DEMO

Code Sample: Custom Rendering

```

public class OverlayDemo extends JFrame implements
    ActionListener, ..., VideoRendererListener {
    ...
    public OverlayDemo (URI uri) {
        mp = new MediaPlayer (uri);

        vrc = mp.getControl (VideoRenderControl.class);
        vrc.addVideoRendererListener (this);

        JPanel controlPanel = createControlPanel ();
        videoCanvas = new VideoCanvas ();

        getContentPane ().add ("Center", videoCanvas);
        getContentPane ().add ("South", controlPanel);

        pack ();
        setVisible (true);
    } ...
  
```

Custom Rendering Demo

DEMO

JMC Summary

- JMediaPlayer, JMediaPane, and MediaProvider contain typical methods for media playback
- Media object provides media stream information
- Integrated with Swing/NetBeans™
- Efficient use of objects in typical scenarios

Media in FXScript

- Media classes are part of `javafx.gui` package
 - Scene-graph based GUI toolkit
 - Support for animation, translucency, and effects
- Implementation based on JMC Classes

FX Classes

> Media

- Attributes include source (URI), duration, resolution, track information, metadata, etc...

> Media Player

- Attributes include media, startTime, stopTime, repeatCount, mediaTime, mediaTimers, volume, rate, etc...
- Functions include play, pause
- Function attributes for onError, onBuffering, etc.

> MediaPlayer

- Attributes are mediaPlayer, preserveAspect etc.
- Extends javafx.gui.Node
 - Attributes include affine transformation (translate, scale, shear, rotate)
 - Supports effects, clip shape, translucency

Code Sample: JavaFX MediaPlayer

```
package fxMediaPlayer;
import javafx.gui.*;

var media = Media{source:"movie.wmv"}
var player = MediaPlayer{media: media, autoPlay:true}
var mediaView = MediaView{mediaPlayer: player}

Frame { content: Canvas{content:mediaView} visible:true }
```

Java FX Demos and Code Examples

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DEMO

Future Directions and Roadmap

- JMC part of FXPlayer™ technology
 - The JavaFX SDK Preview release will be available in June 2008.
 - Please visit <http://www.javafx.com> to pre-register for the SDK Preview release
- Convergence of Java and Java FXScript APIs
- Open Source
- Bundle with JDK release 7
- Included with JavaFX on Mobile Platform
- Future Enhancements
 - Capture, recording, and bidirectional streaming support
 - CODEC finder, use of Modules in Java Specification Request (JSR) 277
 - Optimized rendering

Summary

- JMC provides basic media playback functionality to the Java platform
- Media components are an integrated part of the JavaFX Player
- A cross platform media format is coming and will evolve

For More Information

- The Java™ Media Components API BOF-6511
 - Thursday 8:30 PM
- JavaFX software
 - <http://www.sun.com/software/javafx>
- JMC
 - jmc-feedback@sun.com
- OMS
 - <http://www.openmediacommons.org/>

THANK YOU



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