Rich Client Applications with JavaFX SDK

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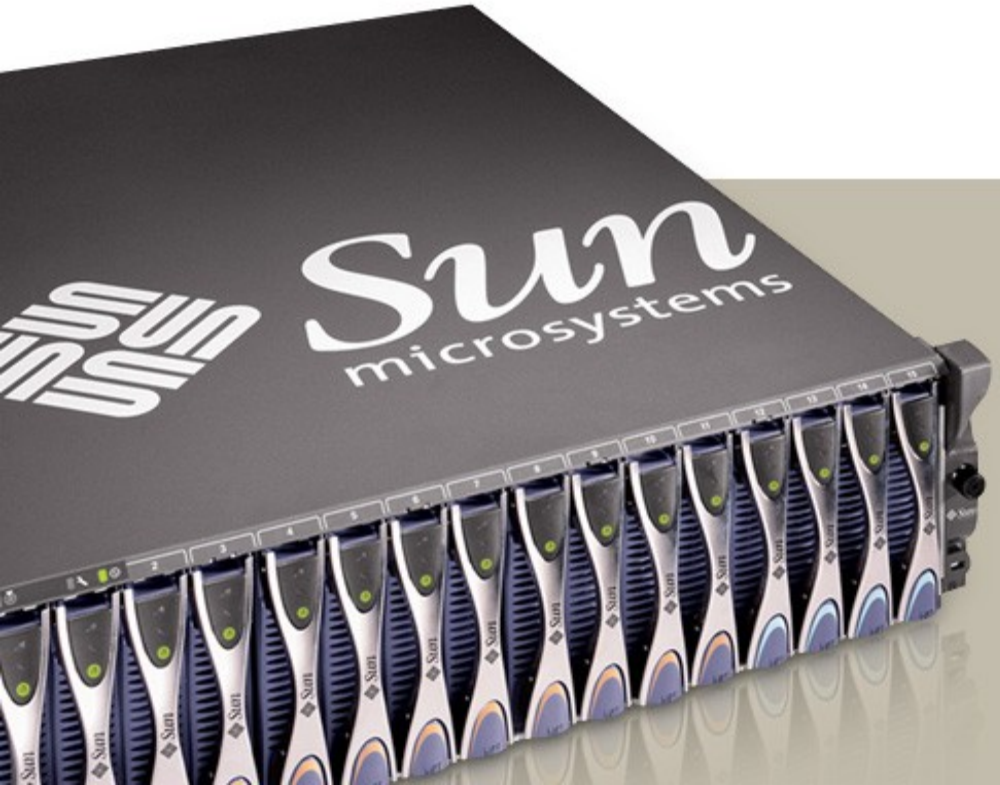
SUN TECH DAYS 2008–2009
A Worldwide Developer Conference

Overview of the JavaFX SDK

Overview



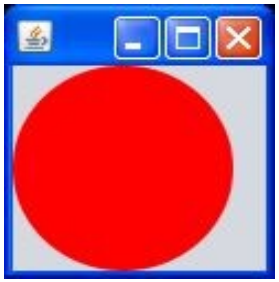
JavaFX Script Programming Language

- Declarative, statically-typed scripting language
- Facilitates rapid GUI development
- Many cool, interesting language features
- Runs on Virtual Machine for the Java™ platform
- Deployment options same as Java programs
- Fully utilizes Java class libraries behind the scenes
- For content designers and Media engineers

Example of JavaFX Application

```
import javafx.application.*;
import javafx.scene.shape.*;
import javafx.scene.paint.*;

Stage {
    scene: Scene {
        content: [
            Circle {
                centerX: 50
                centerY: 50
                radius: 50
                fill: Color.RED
            }
        ]
    }
}
```



(Some) Language Features

Basic Data Types

- Garden variety type
  - **`String`**
  - **`Number/Integer`** – byte, short, int, long, BigInteger
  - **`Boolean`**
  - **`Void`**
- Durations – `1ms`, `2s`, `4m`, `8h`
- Sequences – more later
- Functions

```
var doExit = function():Void {
   System.exit(0);
};
```

Sequences

- Sequences

```
var time:Duration[] = [60ms, 60s, 60m, 60h];
var days = [1..31];
```

- Insert, delete, membership and reverse

```
insert 5s into time;
delete 31 from days;
var revDays = reverse days;
if (!(31 in days) or (30 in days)) “February”
```

- Slice via range and predicate

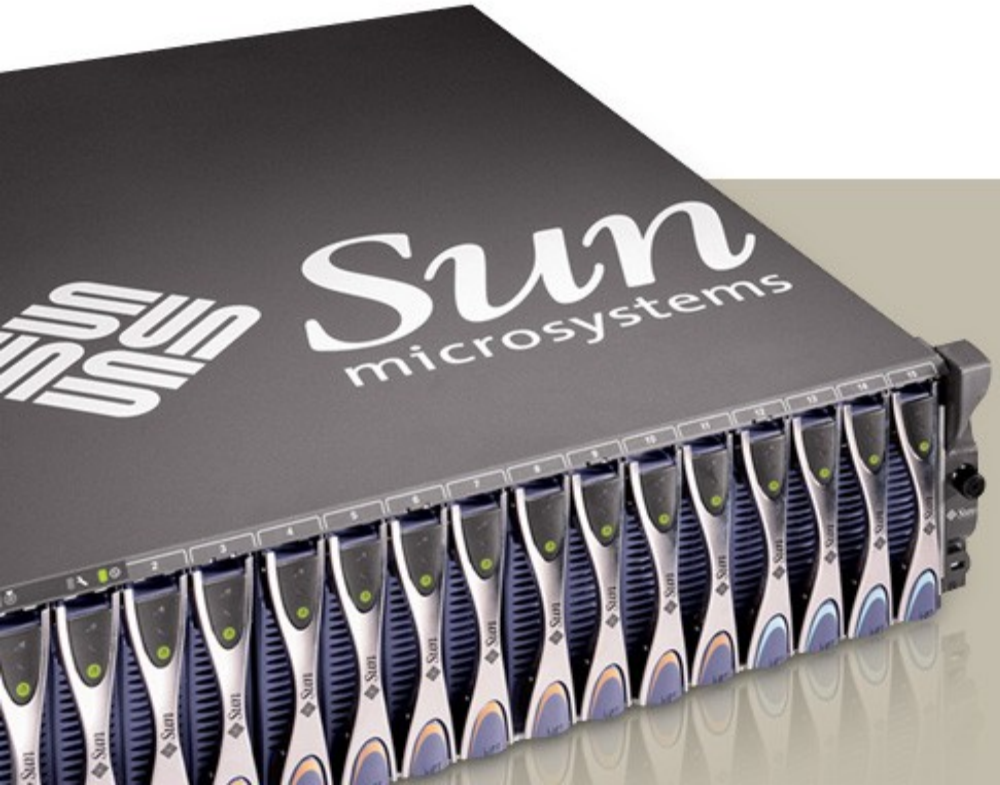
```
var oddDays = days[n | (n mod 2) == 1];
var firstThree = time[0..<3]; //Include 3
```

Data Binding

- Binding associates the RHS to a variable or field
  - Changes to the RHS will cause the value to be reapplied to the field

```
var r = 10;
var area = bind r * r * Math.PI;
r = 5;
area == 78.5714 //true
```

Graphical Objects*



*The fun stuff

Base Graphical Objects

- Graphical objects
  - Text, geometric shapes, images, Swing components
  - Subclass of `Node`
- Some common attributes in nodes
  - Transformation – translate, shear, rotate, scale
  - Clip – displaying only part of the node based on a geometric shape
  - Effect – type of effect, eg. blurring, shadowing, to apply
  - Events – mouse, keyboard
  - Opacity – setting the translucency
  - List is not exhaustive

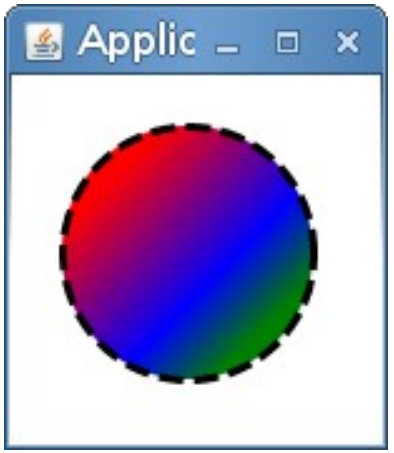
Example – Text

- Displaying text

```
Text {
    effect: DropShadow {
        offsetX: -10
        offsetY: -10
    }
    font: Font {
        name: “DirtyBakersDozen”
        size: 50
    }
    fill: Color.ROYALBLUE
    stroke: Color.BLUE, strokeWidth: 3
    x: 15, y: 80
    content: "Hello World"
}
```

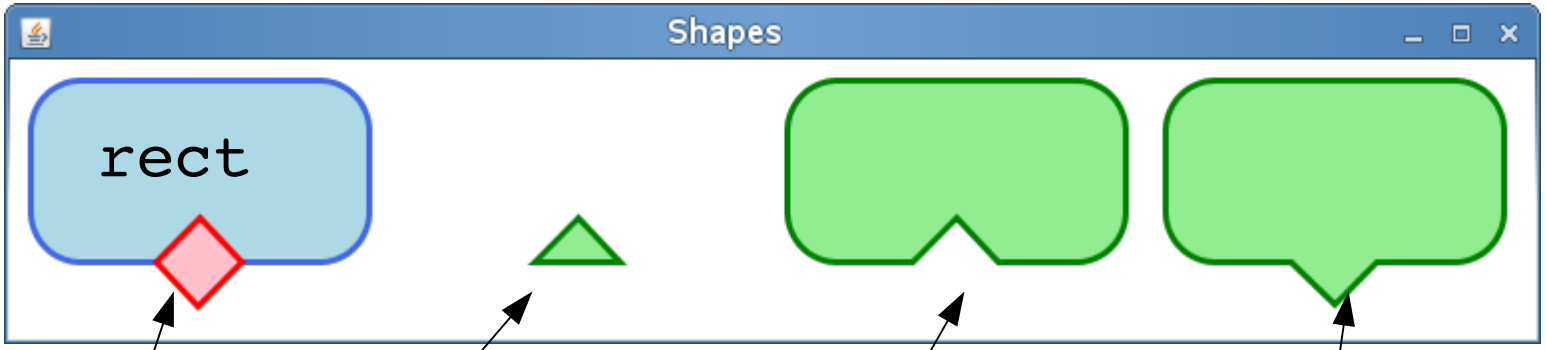
Geometric Shapes

- Arc, ellipse, line, polygon, circle, rectangle
- Very similar to text




```
Circle {
    centerX: 70, centerY: 70
    radius: 50
    fill: LinearGradient {
        startX: 0.0, startY: 0.0
        endX: 1.0, endY: 1.0
        stops: [
            Stop { color: Color.RED, offset: 0.2 }
            Stop { color: Color.BLUE, offset: 0.6 }
            Stop { color: Color.GREEN, offset: 0.8 }
        ]
    }
    stroke: Color.BLACK
    strokeWidth: 3
    strokeDashArray: [ 7 ] strokeDashOffset: 2
}
```

Example – ShapeIntersect, ShapeSubtract



diamond

```
ShapeIntersect {
    a: [rect]
    b: [diamond]
}
```

```
ShapeSubtract {
    a: [rect]
    b: [diamond]
}
```

```
ShapeSubtract {
    a: [rect
        diamond ]
}
```

Example – Path

```
Path {
    fill: Color.LIGHTGRAY
    stroke: Color.GRAY
    strokeWidth: 3
     elements: [
         MoveTo { x: 15 y: 15 },
         ArcTo { x: 50 y: 10 radiusX: 20
              radiusY: 20 sweepFlag: true},
         ArcTo { x: 70 y: 20 radiusX: 20
              radiusY: 20 sweepFlag: true},
         ArcTo { x: 50 y: 60 radiusX: 20
              radiusY: 20 sweepFlag: true},
         ArcTo { x: 20 y: 50 radiusX: 10
              radiusY: 5 sweepFlag: false},
         ArcTo { x: 15 y: 15 radiusX: 10
              radiusY: 10 sweepFlag: true},
     ]
}
```

Images

```
ImageView {
    clip: Rectangle {
        y: 30 x: 50
        width: 350 height: 100
    }
    image: Image { url: "file:///..."}
}
```

Some Effects Supported In JavaFX

```
effect: SepiaTone { level: 0.5 }
```

```
effect: Glow { level: 0.7 }
```

```
effect: GaussianBlur {
    input: SepiaTone {
        level: 0.5 }
    radius: 10.0
}
```

```
effect: Reflection {
    fraction: 0.7
}
```

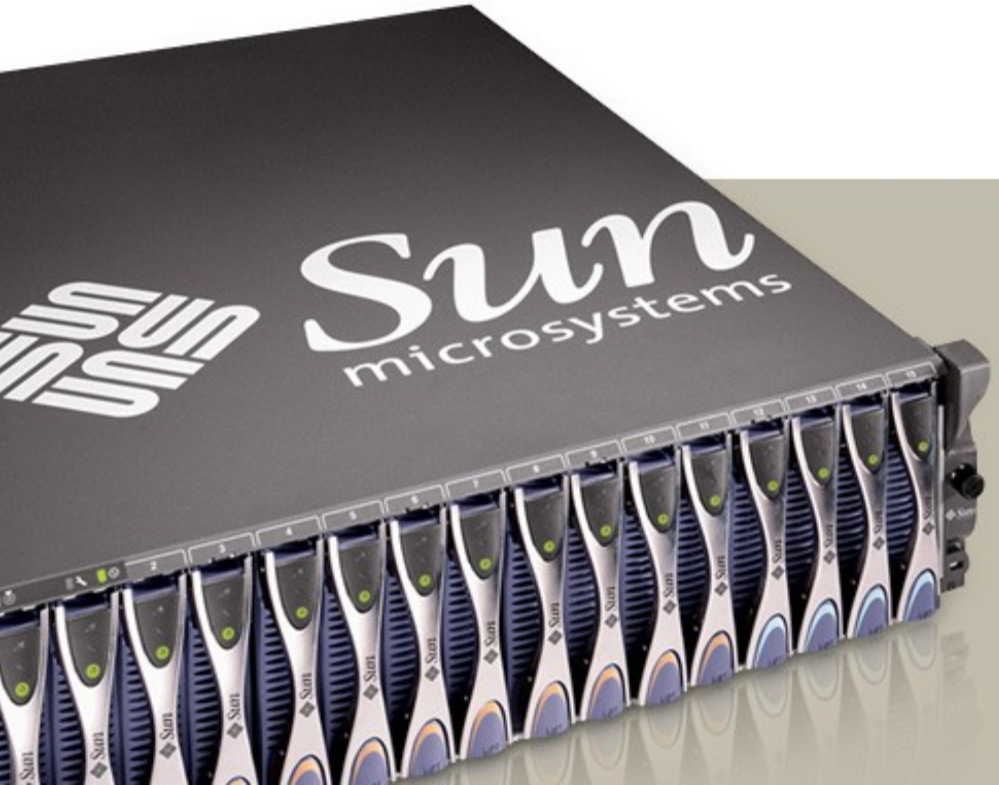
Original image

Lighting Effect

```
effect: Lighting{
    surfaceScale: 7
    light: DistantLight{
        azimuth: 90
        elevation: 30
    }
}
```

```
effect: Lighting{
    surfaceScale: 7
    light: SpotLight {
        x: 0 y :0 z: 50
        pointsAtX: 10
        pointsAtY: 10
        pointsAtZ: 0
    }
}
```

Interactions



Example – Handling Events

Changing the color of the rectangle

```
var rectangle:Rectangle = Rectangle {
    x: 20, y: 10
    width: 150, height: 70
    arcWidth: 50, arcHeight: 50
    fill: Color.LIGHTBLUE
    stroke: Color.ROYALBLUE
    strokeWidth: 3
    onMouseEntered: function( e: MouseEvent ):Void {
        rectangle.fill = Color.WHITESMOKE;
    }
    onMouseExited: function( e: MouseEvent ):Void {
        rectangle.fill = Color.LIGHTBLUE;
    }
}
```

Data Format Parser

- Includes a 'pull' parser that supports JSON and XML
- To use in 'event' mode
  - You will be notified of when the parser gets a token
  - Extends **`PullParser`**
  - Specify the format and input stream
  - Handle input as the parser returns tokens
- Can be use in 'linear' mode as well
  - Direct the parser with **`forward()`** and **`seek()`**

Example – PullParser in 'Event' Mode

```
public class TwitterParser extends PullParser {
    //Trigger when there is a token to be read
    override var event on replace {
        if (event != null) {
            if (event.type == PullParser.START_VALUE)
              System.out.println("start: name = {event.name}")
            else if (event.type == PullParser.END_VALUE)
              System.out.println("\tend: name = {event.name}")
        }
    }
}

var p = TwitterParser {
    documentType: PullParser.JSON
    input: someInputStream
}
p.parse();
```

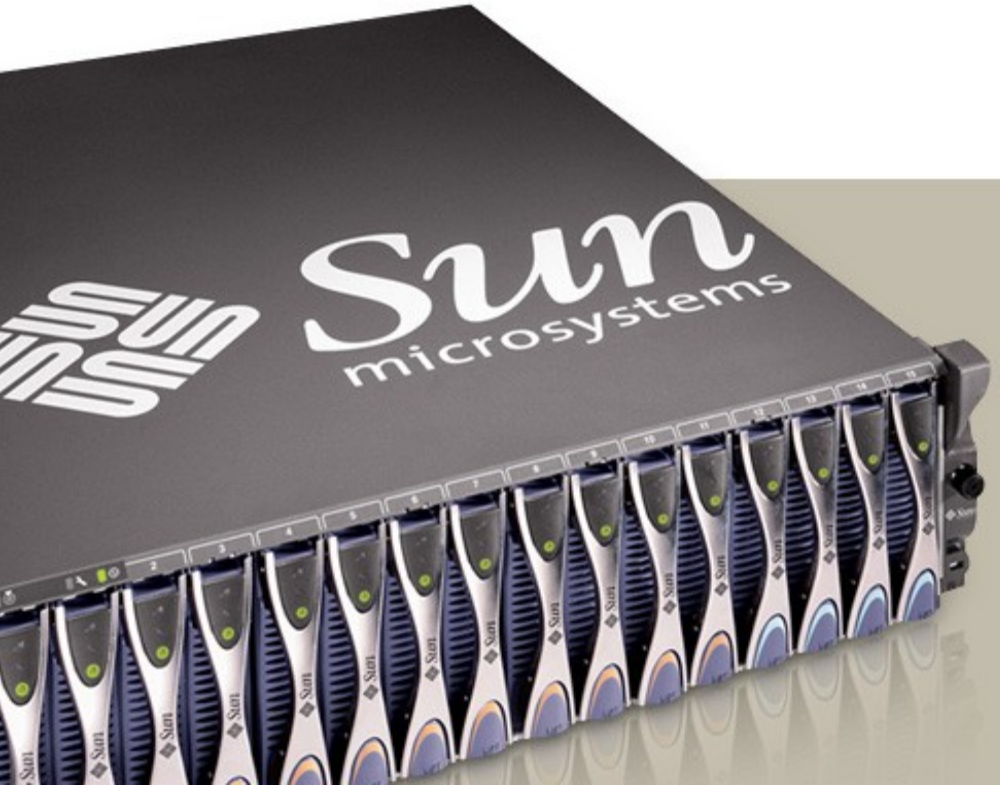
Accessing REST Resources

- Includes an asynchronous HTTP request class
- Need to specify the location and the HTTP method
- Provides access lifecycle events
  - **`started`**, **`connecting`**, **`writing`**, **`reading`**, **`done`**
- Invoke `enqueue()` to start request

Example – Making HTTP Request

```
public class GetTwitter extends HttpRequest {
    //Input will be non null when the entire content is read
    override var input on replace {
        if (input != null) {
            try {
                def p = TwitterParser {
                    documentType: PullParser.JSON
                        input: input
                }
                p.parse();
            } finally {
                input.close();
            }
        }
    }
}
                GetTwitter {
                    location:
                "http://twitter.com/statuses/public_timeline.json"
                    method: HttpRequest.GET
                }.enqueue();
```

Animations

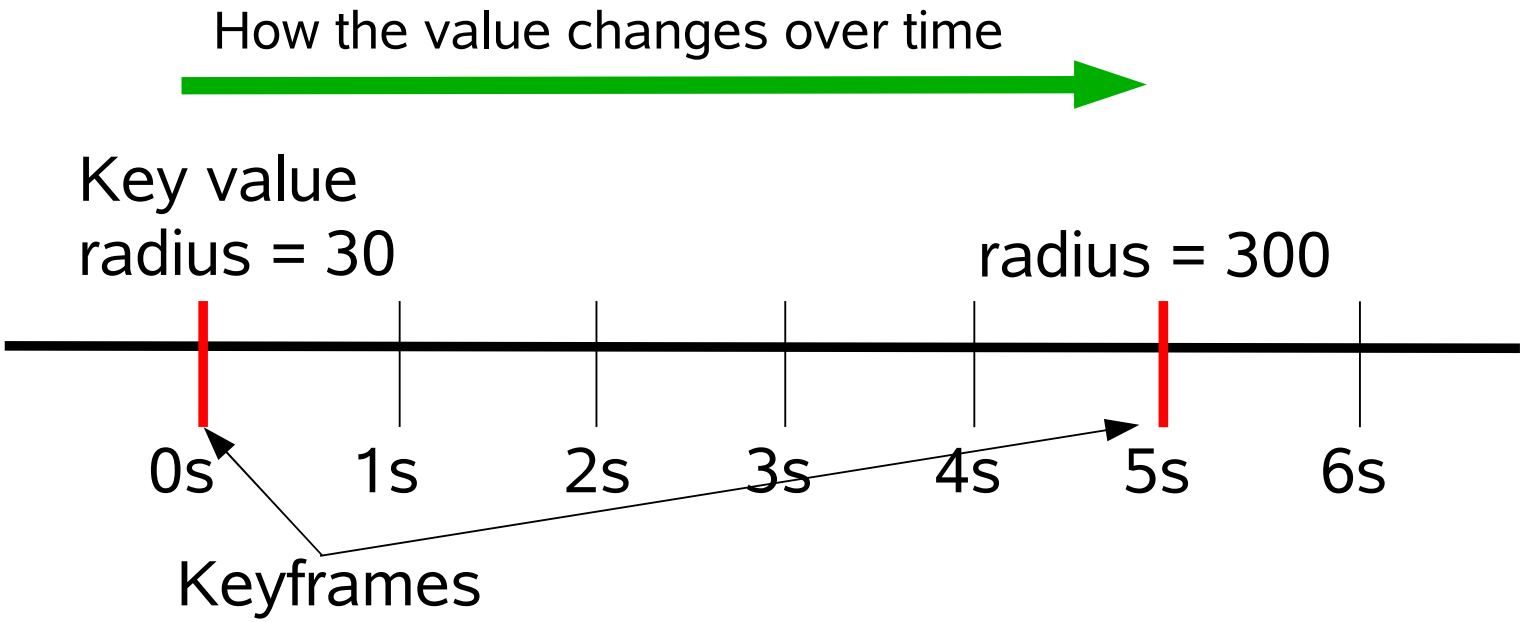


Animation Support

- Timing key in animation
- Native support for time
  - `Duration` class
  - Time literals – `1ms`, `1s`, `1m`, `1h`
  - Eg. `var runFor = 500ms`
- Two types of animation support
  - Transition – canned animation
  - Keyframe based – more flexible but more code

Key Animation Concepts Illustrated

- Vary an attribute over time
- Specify how the value changes over time
- Bind these attribute to objects

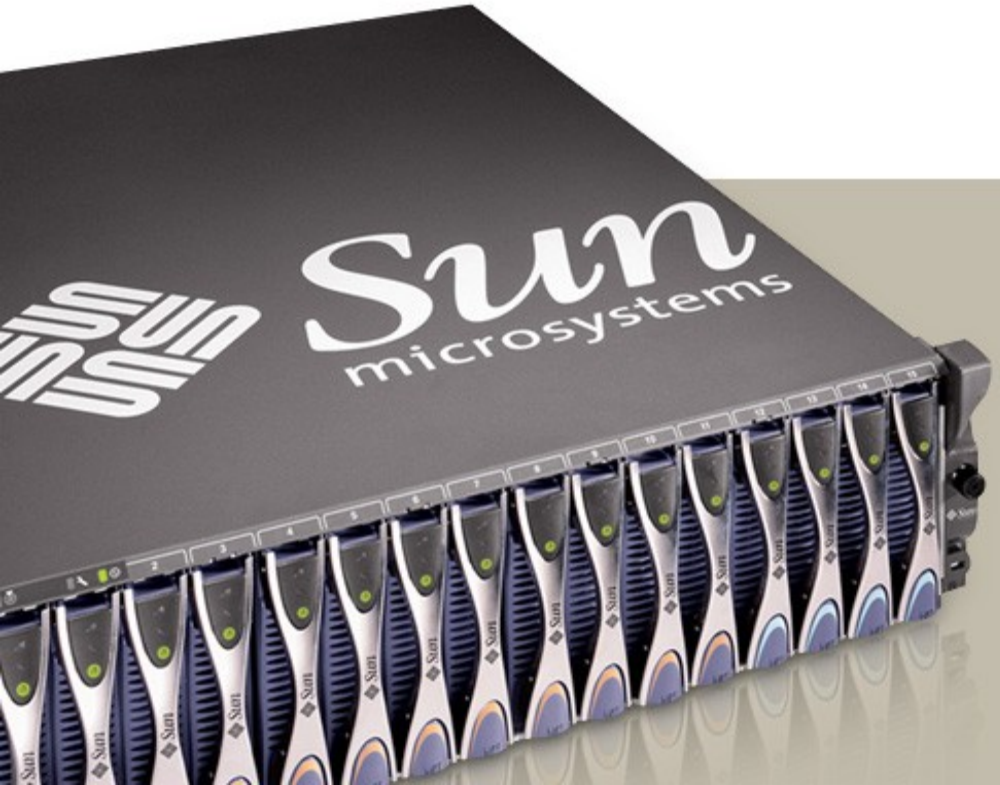


Example – Animating an Object

```
var _radius:Number = 30
var animate:Timeline = Timeline {
    rate: -1 //Default is 1
    keyFrames: [
        at(0s) { _radius => 30 }
        at(5s) { _radius => 300 tween Interpolator.LINEAR }
    ]
}
var circle:Circle = Circle {
    radius: bind _radius
    ...
    function onMouseClicked(e: MouseEvent): Void {
        animate.rate = if (animate.rate == -1) 1 else -1;
        animate.play();
    }
}
```

Changing the value of a bound object

Media

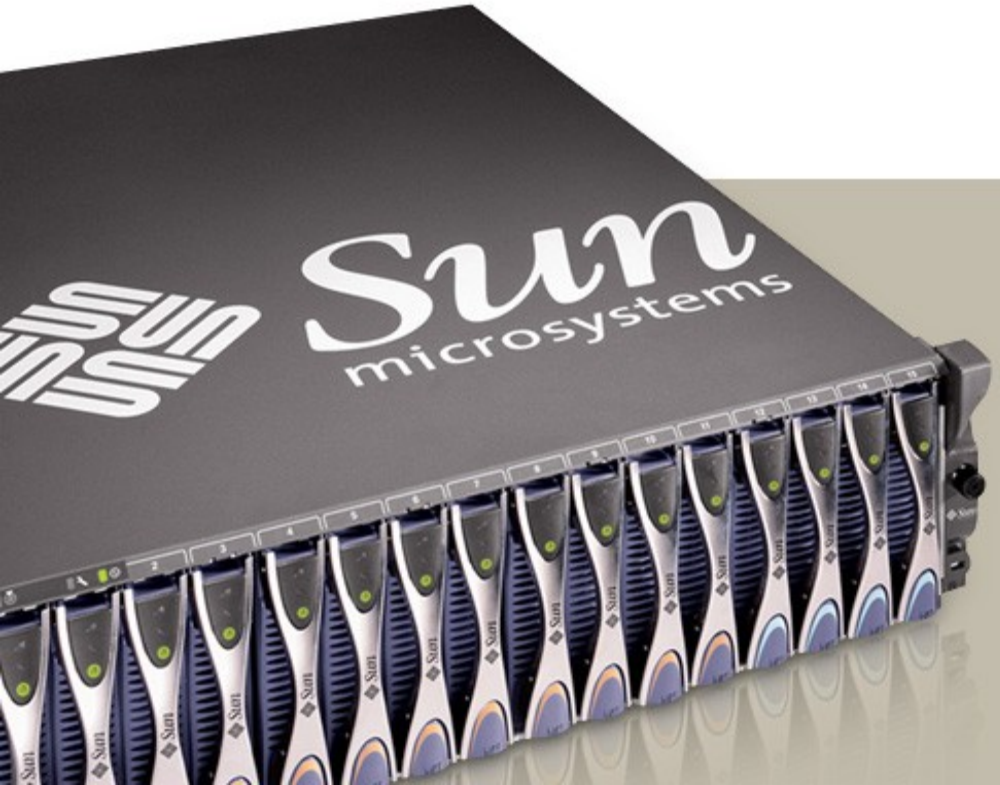


Example of Creating a Media Player

```
var video:Media = Media {
    source: "http://..."
};
var player:MediaPlayer = MediaPlayer {
    media: video
    rate: 1.0
    volume: 0.4
};
var view:MediaView = MediaView {
    mediaPlayer: player
    x:200
    y:200
};
```

```
Stage {
    title: "Media Player"
    width: 700
    height: 700
    scene: Scene {
        content: [view]
    }
}
```

JavaFX Application



Top Level Container

- `Stage` is the top level container
  - Regular, Applet, JavaWeb Start, mobile
  - Defines the characteristics like title, size, location, handling exit, etc
  - Provides hooks for handling different types of deployment – eg. Applet
- `Stage` contains `Scene`
  - The 'panel' for displaying the content

Example of a Stage

```
Stage {
    title : "My app"
    extension: [
        AppletStageExtension { //Valid for applet only
            onDragStart: function(e: MouseEvent): Void {
                circle.fill = Color.LIGHTGREEN;
            }
            onDragFinished: function(e: MouseEvent): Void {
                circle.fill = Color.PINK;
            }
        }
    ]
    scene: Scene {
        width: 500 height: 300
        content: [ circle ]
    }
}
```


Sun microsystems
THANK YOU
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