



Rev Up Your Car PC With Java™ Technology

Brian Briggman
System Architect
CarPCgarage.com

Dr. Catherine Bair
Product Development Manager
CarPCgarage.com

<http://www.carpcgarage.com>

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Goal of This Session

The expanding Car PC market has opened up huge opportunities for enterprising Java platform developers.

In this session, you will learn the role of Java technology in the Car PC environment, and specific open source Java platform software projects that improve the Car PC experience.

Agenda

Why Car PCs Are as Critical as Shelter,
Water, and Food

Anatomy of a Car PC

CarPCgarage.com Open Source Application Demo

Why Is Java Platform the Best Choice
for a Car PC?

Easy Deployment With Java Web Start Software

Third-Party Application Mashups

Agenda

Car PC User Interface Design

Java Platform and MP3s

Embedded Database in Java Platform:
Apache Derby

Car PC Installations: Do-It-Yourself

Essential Car PC Hardware

Handout: Car PC Hardware and Software
Planning Guide

Question and Answer Session

Why Car PCs Are as Critical as Shelter, Water, and Food

Or Reasons to Justify Spending \$\$ on a Car PC

- Never stop to ask for directions—Not that you did before, but now you'll never have to stop again!
- Really know what that “check engine” light means —Without an expensive trip to the dealer
- Never change a CD again—Have your entire music collection available while on the road
- Internet access in your vehicle—Opens up everything from live traffic updates to news feeds to synchronization of audio and video content

Anatomy of a Car PC

What Makes a Car PC a Car PC?

- Form factor
- I/O devices
- Power surges
- Power consumption
- Accessories
 - GPS
 - Engine diagnostics
 - Backup cameras
- Software

Anatomy of a Car PC



Anatomy of a Car PC



Anatomy of a Car PC



Anatomy of a Car PC



Anatomy of a Car PC



Anatomy of a Car PC





CarPCgarage.com Open Source Application

Get in the Driver's Seat With Java Technology

- Car PC Application Manager
- Launch applications
- Play media files (MP3, MPEG, etc...)
- Fully configurable



DEMO

CarPCgarage.com—Open Source Car PC
Application Using Java Technology

Why Is Java Technology the Best Choice for a Car PC?

(Other Than Just Because It's Java!)

- Java technology is write once run anywhere
 - The same application will be able to run on basically any Car PC hardware with any operating system
- Continual improvements in the capabilities of Java technology
 - Java Community ProcessSM (JCPSM) services
 - Extensive Open Source Java Community
- Straightforward multi-threading
 - Playback an MP3, while rotating a display of the ID3 tag, while navigating to the nearest In-and-Out-Burger

Deployment With Java Web Start Software

Benefits to Users and Application Providers

- Benefits to users
 - The application is downloaded and fully installed; this allows it to be run even in an intermittently connected environment, such as a Car PC
 - Configurable control over application access to resources—
Such as for reading/writing files
 - Automatic updates are available when connected to the Internet—Always have all the latest features
- Benefits to application providers
 - Ease of application distribution
 - Ease of application updates
 - Application can become a first class citizen of your users desktop with an icon, splash page, etc.

Deployment With Java Web Start Software

Managing Multiple Java Archive (JAR) Files

- Why multiple JAR files?
 - Users benefit by having much smaller downloads when updates are released
 - Initial download size usually remains unchanged, but can be optimized via multiple downloads containing different resources
- How to partition your application?
 - Individual components can be partitioned out such that users can download the essential features for their intended use of your application
 - Images and graphics are easy candidates
 - Code that changes frequently or is anticipated to change frequently

Deployment With Java Web Start Software

Loading JAR File Resources

- Make resources available via the Classpath
 - Put them in any downloaded JAR file
- `loadResource()` and `loadResourceAsStream()`
- Can be used to load
 - Images
 - Fonts
 - Properties
- Note on fonts for Java Platform, Standard Edition 6.0 (Java SE 6.0)
 - Addition of `registerFont()` method

Code Sample: Loading JAR File Resources in Java Web Start Software

```
ClassLoader cl = this.getClass().getClassLoader();

// Loading Images
ImageIcon I = new ImageIcon(cl.getResource(imgName));

// Loading TrueType Fonts
Font f = Font.createFont(Font.TRUETYPE_FONT,
    cl.getResourceAsStream(fontFileName));
f = f.deriveFont(fontStyle, fontSize);

// Loading TrueType Fonts - Java SE 6.0
GraphicsEnvironment ge =
    GraphicsEnvironment.getLocalGraphicsEnvironment();
ge.registerFont(Font.createFont(Font.TRUETYPE_FONT,
    cl.getResourceAsStream(fontFileName)));
Font f = new Font(fontName, fontStyle, fontSize);
```

Third-Party Application Mashups

Using Java Technology to Address Limitations of Third-Party Apps

- Third-party Car PC applications
 - Usually not optimized for a 7" touchscreen display
- Problem addressed using JWindow overlays
 - Can be properly sized to the environment
 - Can trigger “batch”-like commands
- Use Robot API to Generate KeyPress, KeyRelease, MouseMove, and MouseClick
- Windows solution: Freeware (but non Java platform) AutoIt application for full window interaction
- Linux solution: KHotKey for KDE environments

Code Sample: Third-Party Application Mashups

```
// setAlwaysOnTop available starting with Java 1.5
JWindow window = new JWindow();
window.setAlwaysOnTop(true);
```

```
// Robot class available starting with Java 1.3
public void closeWindow()
{
    try {
        Robot robot = new Robot();
        robot.keyPress(KeyEvent.VK_ALT);
        robot.keyPress(KeyEvent.VK_F4);
        robot.keyRelease(KeyEvent.VK_F4);
        robot.keyRelease(KeyEvent.VK_ALT);
        // Need to close JWindow here also
    } catch (AWTException awte) { }
}
```

Car PC User Interface Design

Improving the User Interface Experience—
CRITICAL for an interface in a Car PC

- Human-CarComputer Interface (HCCI) design
 - Resizable GUIs
 - Recognize the limitations of the car environment
 - 7" touchscreen
 - Limited ability to concentrate on interactions
 - Potentially limited Internet connectivity
 - Using common sense(s)
 - “Blind” touchpoints

Java Technology and MP3s

Support for MP3, OGG VORBIS, WAV, AIFF, AU, and SPEEX in Java Platform!

- JLayer Project
 - Java technology real-time MP3 decoder library
 - Simple API for MP3 playback, LGPL
- jLayer Project
 - Java Platform WinAmp clone
 - WinAmp skins compliant, streaming support, LGPL
- jid3lib Project
 - Java MP3 ID3 Tag Library—Still in beta, but will support 99.99% of tags out there
 - Access to all tag data (album covers, lyrics, etc.), LGPL

Code Sample: Using the JLayer API

```
// Necessary imports
import java.io.IOException;
import javazoom.jl.player.Player;

// Simple example to play an MP3 file:
Player player;
try {
    FileInputStream fis = new
        FileInputStream(mp3FileName);
    if(player != null && player.isComplete()) {
        player.play();
    }
} catch(IOException ioe) { }
```


Code Sample: Using the jid3lib Library

```
// Necessary imports
import org.farng.mp3.MP3File;
import org.farng.mp3.TagException;
import org.farng.mp3.id3.ID3v2_3;

// Simple example to get ID3 tag information:
try {
    RandomAccessFile file = new
        RandomAccessFile(musicList.get(i), "r");
    ID3v2_3 tag = new ID3v2_3(file);
    displayName = tag.getTrackNumberOnAlbum() +
        " " + tag.getSongTitle();
} catch (TagException te) {
} catch (IOException ioe) {
}
```

Embedded Database in Java Platform: Apache Derby

An SQL Database Embedded Into Your Application, Even When Using Java Web Start Software!

- Apache Derby
 - Java technology-based, fully transactional relational database
 - Standards-based: SQL, JDBC API
 - 2 MB JAR file
 - Embeddable into Java applications
 - Apache License Version 2.0
- Derby History
 - Sun Microsystems supported distribution included in Java SE 6.0 platform as Java DB
 - IBM open sourced CloudScape to create Derby in 2004

Code Sample: Apache Derby

```
// Test to see if the database is installed and active
Properties dbProps = new Properties();
dbProps.put("user", "carpc");
dbProps.put("password", "carpc");

Connection conn = null;    Statement s = null;
try {
    Class.forName("org.apache.derby.jdbc.EmbeddedDriver");
    conn = DriverManager.getConnection(
        "jdbc:derby:carpc;create=true", dbProps);
    s = conn.createStatement();
    ResultSet rs = s.executeQuery("select version_id from
carpc_version");
// SNIP - Code to iterate ResultSet and check versionId
    rs.close();    s.close();
} catch(ClassNotFoundException cnfe) { }
catch(SQLException sqle) { }
```

Car PC Installations: Do-It-Yourself

How Do You Get That Car PC Hardware Installed?

- Outsource the Installation
 - Try your auto dealer—Unlikely
 - Try your local Car Audio installation shop—Possibility
 - Try locating local Car PC enthusiast groups—Great
- Do-it-yourself (you are a real geek, aren't you?)
 - Get a copy of Car PC Hacks from O'Reilly
 - Get a copy of the Haynes or Chilton manual for your specific make and model of vehicle
 - Look for help on Car PC forums such as:
<http://www.carpcgarage.com/community>

Car PC Installations: Do-It-Yourself



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Essential Car PC Hardware

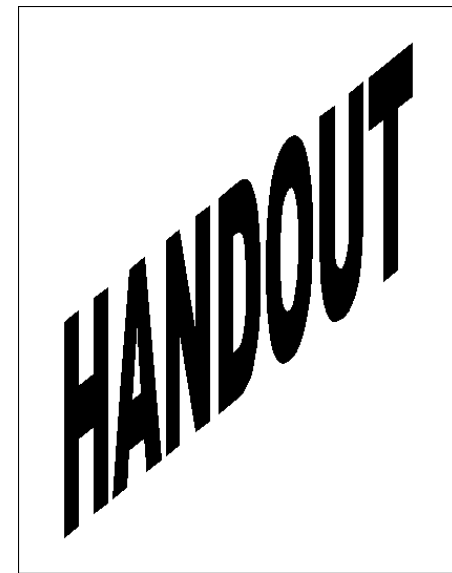
What Hardware Goes Into a Typical Car PC?

- In-dash touchscreen display
 - 7" DIN slot fold-out touchscreen is typical
 - ~ \$400–\$600
- The computer itself
 - Varies widely based on needs
 - ~ \$500–\$800
- Major accessories
 - Power system ~ \$50–\$90
 - GPS and navigation software ~ \$50–\$130
 - On Board Diagnostics (OBD) adapter ~ \$50–\$140
 - Cables ~ \$50–\$150
- TOTAL: ~ \$1,000–\$1,500 if you don't go too crazy

Handout: Car PC Hardware and Software Planning Guide

The Little Things Add Up...

- Power estimation guide
- Cable sizing guide
- Hardware list
- Tools list
- Software list



Summary

- Java technology has a perfect fit in the Car PC environment
- Java APIs, the Java Community Process services, and open source Java platform projects all come together to enable an excellent base application for Car PCs
- The art of Human-CarComputer Interface (HCCI) design is in its infancy, but growing quickly
- Opportunities abound in the Car PC arena for enthusiastic Java platform developers!

Future Directions for Java Technology in the Car PC Environment

- Offline web pages, Jetty Embedded Web Server
- RSS news feeds
- Home server synchronization
- Connectivity options
- Enhanced interactivity, animation and programming
- Cutting edge car PC features
- New input and output methods

For More Information

- The 2007 JavaOneSM Conference Sessions
 - Apache Derby-related
 - TS-69700—Enabling Offline Web Applications with Java DB
 - TS-45170—Java DB Performance
- Open Source Java Platform projects
 - CarPCgarage App: <http://www.carpcgarage.com>
 - JLayer and jlGui: <http://www.javazoom.net>
 - jid3lib: <http://jid3lib.dev.java.net>
 - Apache Derby: <http://db.apache.org/derby>
- Related books
 - Car PC Hacks: <http://www.oreilly.com/catalog/carpchks>



Q&A

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