
<JSTORM>

Java Web Start 1.0 가



JSTORM
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Reference	Developer's Guide Java Web Start Version 1.0 (http://java.sun.com/products/javawebstart/docs/developersguide.html)
Benchmark information	

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JNLP API	16



Java Web Start 1.0 가

Developer's Guide Java™ Web Start JNLP

comment feedback javawebstart-feedback@eng.sun.com

Java Web Start

Java Web Start (helper)
가 (launch) 가 , Java
Web Start , Java (Java Technology-
based application) (download), (cache), (run).

(interaction)
, Java Web Start (deploy)

- o Java Web Start Java 2 SE
(launch) ,
가 , 95/98/2000, ,
. Java
(robust), , (expressive) ,

- o Java Web Start Java 2 Standard Edition
, Java 2 SE 1.3.0
(conflict)
Java Web Start

- o Java Web Start (launch 가)
(off-line) (operation)
(Web-deployed) (native)
- o Java Web Start Java
(protective environment - sandbox) 가
- o Java Web Start
Java 2 SE
- o Java Web Start

Java Web Start Java™ Network Launching Protocol & API (JNLP)
Java Community Process (JCP) Java Web Sta
rt JNLP (reference implementation : RI) JNL
P JNLP 가

Java Web Start 가?

Java Web Start <http://java.sun.com/products/javawebstart/>
JNLP http://java.sun.com/aboutJava/communityprocess/jsr/jsr_056_jnlp.html

/
Java Runtime Environment (JRE) 1.2.2
Java Web Start 1.0 Windows 95/98/NT/2000, Solaris (SPARC & Intel editions), Linux (RH6.1/x86) 가 README
(<http://java.sun.com/products/javawebstart/docs/readme.html>)

. Java Web Start

MIME

Java Web Start HTTP
HTML
art Java

(infrastructure)가 Java Web St

JAR JNLP
Java Web Start

HTML

MIME

1. Web server Java Web Start MIME

.jnlp 가 application/x-java-jnlp-file MIME 가

(return) MIME . Java Web Start가

JNLP application/x-java-jnlp-file MIME
MIME 가

.mime.types

가

application/x-java-jnlp-file JNLP

2. JNLP

JNLP 가

JNLP (syntax) (format) (section)

3. 가

JAR JNLP JNLP URL 가

4. JNLP Link

JNLP

HTML

```
<a href="MyApp.jnlp">Launch My Application</a>
```

.jnlp

가

application/

x-java-jnlp-file MIME

가

Java

Web Start

Java Web Start (installer)

Java Web Start

Java Web Start가

Java Web Start가

HTML

JavaScript

VBScript

가

가

```
<SCRIPT LANGUAGE="Javascript">  
<!--  
insertLink("http://www.mycompany.com/my-app.jnlp",  
"My Application");  
// -->  
</SCRIPT>
```

insertLink Java Web Start 가

HTML

```
<a href="http://www.mycompany.com/my-app.jnlp">My Application</a>
```

Java Web Start가

HTML

Need to install Java Web Start

가

JavaScript VBScript

```
<SCRIPT LANGUAGE="Javascript">
```

```
var javawsInstalled = 0;
isIE = "false";

if (navigator.mimeTypes && navigator.mimeTypes.length) {
    x = navigator.mimeTypes['application/x-java-jnlp-file'];
    if (x) javawsInstalled = 1;
} else {
    isIE = "true";
}

function insertLink(url, name) {
    if (javawsInstalled) {
        document.write("<a href=" + url + ">" + name + "</a>");
    } else {
        document.write("Need to install Java Web Start");
    }
}
</SCRIPT>

<SCRIPT LANGUAGE="VBScript">
on error resume next
If isIE = "true" Then
    If Not(IsObject(CreateObject("JavaWebStart.IsInstalled"))) Then
        javawsInstalled = 0
    Else
        javawsInstalled = 1
    End If
End If
</SCRIPT>
```

Java Web Start	Java 2
stand-alone	.
(entry point)	public static void main(String[] argv)
,	(
(sandbox)	가 가
o	JAR
o	(resource) JAR
.	Java 2 getResource
.(.)

```
o
--
-- JAR
-- JAR 가
--security manager 가 가
--native library 가
-- System.exit
o signed JAR
JAR sign
```

JAR Resource 가

```
Java Web Start JAR
JAR
```

(disk-relative reference)

```
JNLP resource section JAR
HTTP request 가
JAR JAR
Java Web Start
JAR 가
```

```
// classloader 가
ClassLoader cl = this.getClass().getClassLoader();
//
Icon saveIcon = new ImageIcon(cl.getResource("images/save.gif"));
Icon cutIcon = new ImageIcon(cl.getResource("images/cut.gif"));
...
```

```
JAR 가
```

```
images/save.gif
images/cut.gif
```

Signing

Java Web Start 가 .
o ()
o

Java Web Start

Java Web Start

Java Web Start가 가 digital code signing .
Start JAR sign JAR , Java Web
signature sign digital
, Java Web Start 3 가

code signing (application service
provider) 가 code
sign , signed
가 signer
Java Web Start 가
JAR JNLP sign

```
<security>  
<all-permissions/>  
</security>
```

Java Web Start code signing Java 2 security API
. Java 2 SE JRE 1.2.x SHAwithSDA code signing ,
Java 2 SE JRE 1.3 MD2withRSA MD5withRSA . MD5withRSA

가
Java 2 SE SDK jarsigner Java Applet
Java Web Start sign jarsigner
(<http://java.sun.com/j2se/1.3/docs/tooldocs/win32/jarsigner.html>)
sign , signing
Java Web Start Java 2 SE JRE 1.3.0 Netscape signtool
Netscape (<http://developer.netscape.com/software/signedobj/>)

JNLP

JNLP 0.4 early access release . 0.4 JNLP Java
Web Start 1.0 가 가
o spec 1.0
o unrestricted all-permissions
o jre j2se resources
(j2se resources .)
1.0-beta 1.0-rc JNLP spec "1.0"
. JNLP

JNLP

Proposed Final Draft Review of the Java Network Launch
Protocol and API (JNLP) Specification, v1.0 가
JNLP
(http://java.sun.com/aboutJava/communityprocess/jsr/jsr_056_jnlp.html)

JNLP XML . JNLP .

```
<?xml version="1.0" encoding="utf-8"?>  
<!-- JNLP File for SwingSet2 Demo Application -->  
<jnlp  
spec="1.0+"  
codebase="http://javaweb.eng.com/jaws/apps"
```

```

href="swingset2.jnlp">
<information>
  <title>SwingSet2 Demo Application</title>
  <vendor>Sun Microsystems, Inc.</vendor>
  <homepage href="docs/help.html"/>
  <description>SwingSet2 Demo Application</description>
  <description kind="short">A demo of the capabilities of the Swing
Graphical User Interface.</description>
  <icon href="images/swingset2.jpg"/>
  <offline-allowed/>
</information>
<security>
  <all-permissions/>
</security>
<resources>
  <j2se version="1.3"/>
  <jar href="lib/SwingSet2.jar"/>
</resources>
<application-desc main-class="SwingSet2"/>
</jnlp>

```

resources, application-desc 4 . root information, security,
Web Start applet-desc Applet jnlp . Java

JNLP

spec attribute : 1.0
"1.0+"
codebase attribute : JNLP href (relative) URL
base URL
href attribute : JNLP 가 URL
(Application Manager) 가

title element :

vendor element :

homepage element : 가 URL href

description element : . description
. kind description 가 ,
가 .
o *one-line* : , description .
o *short* : , description .
o *tooltip* : description tooltip .

description kind 가 . kind
description , Java Web Start가 short
가 kind description , JNLP ,
description
description .HTML

icon element : GIF JPEG HTTP URL
Java Web Start가

width height

offline-allowed element : offline-allowed

JNLP 가

Applet
. security
all-permissions 가 ,
, JAR sign .

resources Java , native library,
. os, arch, locale OS,

, locale
resources jar, nativelib, j2se, property, package, extension 6
가 . package extension 가
(http://java.sun.com/aboutJava/community-process/jsr/jsr_056_jnlp.html)
jar (classpath) JAR .

<jar href="myjar.jar"/>

JAR ClassLoader JVM (load) . JAR
Java . jar
getResource 가

nativelib native library JAR . .

<nativelib href="lib/windows/corelib.jar"/>

JNLP JAR (/) 가 System.load
(load) 가 .
.dll, Solaris/Linux lib.so .
(shared library) System.load
native library OS (guarded) resources

<resources os="SunOS" arch="sparc">
<nativelib href="lib/solaris/corelibs.jar"/>
</resource>

jar nativelib , JVM
(locally) 가 . jar nativelib
가 .
가 .

download (eagerly) (lazily)

```
<jar href="sound.jar" download="lazy"/>  
<nativelib href="native-sound.jar" download="eager"/>
```

j2se Java Virtual Machine
Java 2 SE Runtime Environment (JRE) . JRE가 가 ,
JRE 가 가

```
<j2se version="1.3" initial-heap-size="64m"/>  
<j2se version="1.2"/>
```

version Java 2
"1.2" "1.3" . JNLP 'Java 2 JRE 1.2.2-001 by Sun Microsystems,
Inc.' (product version)

property System.getProperty System.getProperties
name value
<property name="key" value="overwritten"/>

Application-Desc

application JNLP ()
. application main class
main-class 가 . main-class
public static void main(String argv[])
main-class JNLP JAR main class
manifest
argument argument

```
<application-desc main-class="Main">  
<argument>arg1</argument>  
<argument>arg2</argument>  
</application-desc>
```

Applet-Desc

Java Web Start Java Applet Java
Web Start (migration)
Applet application-desc applet-desc

```
<applet-desc
  documentBase="http://..."
  name="TimePilot"
  main-class="TimePilot.TimePilotApp"
  width="527"
  height="428">
<param name="key1" value="value1"/>
<param name="key2" value="value2"/>
</applet-desc>
```

Applet JAR 가 resources
.JNLP HTML docume
ntBase HTML
. main-class code . main-class
Applet (.class)
JAR Main-Class manifest Applet
: Applet Java Web Start JAR

JNLP API

JNLP API 가 . API
Applet AppletContext
: BasicService, ClipboardService,
DownloadService, FileOpenService, FileSaveService, PrintService, and PersistenceService.
JNLP API public jnlp.jar . JAR
JNLP API

```
javac -classpath .:jnlp.jar *.java
```

jnlp.jar JNLP Developers Pack 1.0

BasicService

javax.jnlp.BasicService	Java Applet	AppletContext
(query),	(interact)	.
showURL	가 URL	JNL
P API	true ,	false .

```
import javax.jnlp.*;
...

// URL
boolean showURL(URL url) {
    try {
        // javax.jnlp.BasicService object lookup .
        BasicService bs =
        (BasicService)ServiceManager.lookup("javax.jnlp.BasicService");
        // showDocument .
        return bs.showDocument(url);
    } catch(UnavailableServiceException ue) {
        // 가 .
        return false;
    }
}
```

ClipboardService

javax.jnlp.ClipboardService	shared system-wide (restricted execution environment)	
Java Web Start	(untrusted)	(overwrite)

```
import javax.jnlp;
...

private ClipboardService cs;

try {
    cs = (ClipboardService)ServiceManager.lookup
    ("javax.jnlp.ClipboardService");
}
```

```
    } catch (UnavailableServiceException e) {
        cs = null;
    }

    if (cs != null) {
        // system clipboard contents string selection
        StringSelection ss = new StringSelection("Java Web Start!");
        cs.setContents(ss);
        // system clipboard contents 가 print
        Transferable tr = cs.getContents();
        if (tr.isDataFlavorSupported(DataFlavor.stringFlavor)) {
            try {
                String s = (String)tr.getTransferData(DataFlavor.stringFlavor);
                System.out.println("Clipboard contents: " + s);
            } catch (Exception e) {
                e.printStackTrace();
            }
        }
    }
}
```

DownloadService

javax.jnlp.DownloadService

(cache) (control)

```
import javax.jnlp.*;
...

DownloadService ds;

try {
    ds =
(DownloadService)ServiceManager.lookup("javax.jnlp.DownloadService");
} catch (UnavailableServiceException e) {
    ds = null;
}

if (ds != null) {
```

```
    try {
        // (resource)
        URL url =
            new
URL("http://java.sun.com/products/javawebstart/lib/draw.jar");
        boolean cached = ds.isResourceCached(url, "1.0");
        // (resource)
        if (cached) {
            ds.removeResource(url, "1.0");
        }
        // (resource) reload
        DownloadServiceListener dsl = ds.getDefaultProgressWindow();
        ds.loadResource(url, "1.0", dsl);
    } catch (Exception e) {
        e.printStackTrace();
    }
}
```

FileOpenService

javax.jnlp.FileOpenService

(import)
(Web-deployed)

HTML
. HTML form

```
import javax.jnlp.*;
```

...

FileOpenService fos;

```
    try {
        fos =
(FileOpenService)ServiceManager.lookup("javax.jnlp.FileOpenService");
    } catch (UnavailableServiceException e) {
        fos = null;
    }
}
```

```
if (fos != null) {
    try {
```

```
// 가
FileContents fc = fos.openFileDialog(null, null);
//
FileContents [] fcs = fos.openMultiFileDialog(null, null);
} catch (Exception e) {
    e.printStackTrace();
}
}
```

Using FileContents

FileSaveService

javax.jnlp.FileSaveService

(Web-deployed)

Save As...

```
import javax.jnlp.*;
...

FileSaveService fss;
FileOpenService fos;

try {
    fos =
(FileOpenService)ServiceManager.lookup("javax.jnlp.FileOpenService");
    fss = (FileSaveService)ServiceManager.lookup
        ("javax.jnlp.FileSaveService");
} catch (UnavailableServiceException e) {
    fss = null;
    fos = null;
}

if (fss != null && fos != null) {
    try {
        // FileOpenService 가
        FileContents fc = fos.openFileDialog(null, null);
        //
        FileContents newfc = fss.saveFileDialog(null, null,
```

```
        fc.getInputStream(), "newFileName.txt");  
        //  
        FileContents newfc2 = fss.saveAsFileDialog(null, null, fc);  
  
    } catch (Exception e) {  
        e.printStackTrace();  
    }  
}
```

Using FileContents

PrintService

javax.jnlp.PrintService

Java Web Start (request)

```
import javax.jnlp.*;  
...  
  
PrintService ps;  
  
try {  
    ps = (PrintService)ServiceManager.lookup("javax.jnlp.PrintService");  
} catch (UnavailableServiceException e) {  
    ps = null;  
}  
  
if (ps != null) {  
    try {  
        // default PageFormat 가  
        PageFormat pf = ps.getDefaultPage();  
  
        // 가 PageFormat customize  
        PageFormat newPf = ps.showPageFormatDialog(pf);  
  
        // PrinterJob object 가 print  
        PrinterJob pj = PrinterJob.getPrinterJob();  
        Printable myPrintable = getPrintableDocument();
```

```
        pj.setPrintable(myPrintable);

// print
// 가 print
    if (pj.printDialog()) {
        pj.print();
    }
} catch (Exception e) {
    e.printStackTrace();
}
}

Printable getPrintableDocument() {
    // Printable object construct return code
    ...
}
```

PersistenceService

javax.jnlp.PersistenceService

HTML

, 가 URL HTML

```
import javax.jnlp.*;
...

PersistenceService ps;
BasicService bs;

try {
    ps = (PersistenceService)ServiceManager.lookup
        ("javax.jnlp.PersistenceService");
    bs = (BasicService)ServiceManager.lookup("javax.jnlp.BasicService");
} catch (UnavailableServiceException e) {
    ps = null;
    bs = null;
}
```

```
if (ps != null && bs != null) {

    try {
        // URL muffin(?) .
        URL codebase = bs.getCodeBase();
        String [] muffins = ps.getNames(url);

        // muffin attributes(tags) 가 .
        // muffine dirty server copy update .
        int [] tags = new int[muffins.length];
        URL [] muffinURLs = new URL[muffins.length];
        for (int i = 0; i < muffins.length; i++) {
            muffinURLs[i] = new URL(codebase.toString() + muffins[i]);
            tags[i] = ps.getTag(muffinURLs[i]);
            // DIRTY tag server update .
            if (tags[i] == PersistenceService.DIRTY) {
                doUpdateServer(muffinURLs[i]);
            }
        }
    }

    // muffin contents read .
    FileContents fc = ps.get(muffinURLs[0]);
    long maxsize = fc.getMaxLength();
    byte [] buf = new byte[fc.getLength()];
    InputStream is = fc.getInputStream();
    long pos = 0;
    while((pos = is.read(buf, pos, buf.length - pos)) > 0) {
        // just loop
    }
    is.close();

    ps.delete(muffinURLs[0]);

    // muffin data 가 .
    ps.create(muffinURLs[0], maxsize);
    fc = ps.get(muffinURLs[0]);
        // don't append
    OutputStream os = fc.getOutputStream(false);
    os.write(buf);
    os.close();
}
```

```
    } catch (Exception e) {  
        e.printStackTrace();  
    }  
}  
  
void doUpdateServer(URL url) {  
    // URL persistent data server's copy update .  
    ...  
    ps.setTag(url, PersistenceService.CACHED);  
}
```

FileContents

FileContents (encapsulate) .
FileOpenService, FileSaveService, PersistenceService .
, FileContents 가 .

```
import javax.jnlp.*;  
...  
  
FileOpenService fos;  
  
// fos . (FileOpenService .)  
...  
  
if (fos != null) {  
  
    try {  
  
        // FileOpenService FileContents object 가 .  
        FileContents fc = fos.openFileDialog(null, null);  
  
        // InputStream 가 read .  
        byte [] buf = new byte[fc.getLength()];  
        InputStream is = fc.getInputStream();  
        int pos = 0;  
        while ((pos = is.read(buf, pos, buf.length - pos)) > 0) {  
            // just loop  
        }  
        is.close();  
    }  
}
```

```
// OutputStream 가 write .  
if (fc.canWrite()) {  
    // don't append  
    OutputStream os = fc.getOutputStream(false);  
    os.write(buf);  
}  
  
} catch (Exception e) {  
    e.printStackTrace();  
}  
}
```

JNLPRandomAccessFile

JNLPRandomAccessFile random access
. random access
JNLPRandomAccessFile 가 random access

```
import javax.jnlp.*;  
...  
  
FileOpenService fos;  
  
// fos . (FileOpenService .)  
...  
  
if (fos != null) {  
    try {  
        // 가 open .  
        FileContents fc = fos.openFileDialog(null, null);  
  
        // 가 .  
        long grantedLength = fc.getLength();  
        if (grantedLength + 1024 > fc.getMaxLength()) {  
            // 가 .  
            grantedLength = fc.setMaxLength(grantedLength + 1024);  
        }  
  
        // 가 가 ,  
        // JNLPRandomAccessFile representation
```

```
// write .  
if (fc.getMaxSize() > fc.getLength() && fc.canWrite()) {  
    JNLPRandomAccessFile raf = fc.getRandomAccessFile("rw");  
    raf.seek(raf.length() - 1);  
    raf.writeUTF("Java Web Start!");  
    raf.close();  
}  
} catch (Exception e) {  
    e.printStackTrace();  
}  
}
```