



CMER

Centre for Mobile Education and Research

Developing Mobile Applications for BlackBerry Devices



BlackBerry Devices

- BlackBerry was introduced in 1999 by Research In Motion (RIM)
- One of the powerful services a BlackBerry device provides is the ubiquitous email access
 - **send and access emails at anytime, from anywhere (wireless email)**
- Other features include: Web browsing (wireless Internet), QWERTY keyboard (SureType), Trackball, Voice Recording, GPS Module, Bluetooth capability, USB capability, Telephone, Voice dialing, etc.



BlackBerry Device Types

- **BlackBerry devices can be categorized into two main groups**
 - **BlackBerry Smartphones (or Handheld devices)**
 - **Some have look and feel of cell phones (i.e. 7100i)**
 - **Some are more like PDAs (i.e. 7250)**
 - **BlackBerry-enabled devices**
 - **Non-BlackBerry devices that take advantage of BlackBerry technologies**



BlackBerry Smartphones: Overview

- BlackBerry Smartphones are devices that are built by RIM
 - Have BlackBerry OS
- Some BlackBerry devices
 - 7100g,i,r
 - 7130c,e,g
 - 7250,7290
 - 8300,8310
 - 8800,8820
 - 8700c,g,e,r
 - Pearl



7250



7100g



7100i



7130c



Pearl 8100



Latest BlackBerry Smartphones



Storm 9530



Bold 9000



Curve 8900



Pearl Flip Series



BlackBerry Smartphones: Common Features

- **Advanced security features**
- **Wireless push delivery of email and data**
- **Secure access to Internet- and intranet-based applications**
- **Single mailbox integration**
- **Attachment viewing of popular file formats**
- **Wireless email reconciliation**
- **Wireless calendar synchronization**
- **Remote address book lookup**
- **FIPS 140-2 validations**
- **Support for 3DES and AES encryption**



BlackBerry Smartphones: Feature Comparison

BlackBerry 7100g

basic features include

- Wireless email
- Organizer
- Browser
- Phone
- Corporate data access
- SMS

service providers include

- Cellular One, Edge
Wireless



BlackBerry 7100i

basic features include

- Wireless email
- Organizer
- Browser
- Phone
- Corporate data access
- SMS
- MMS
- GPS

service providers include

- LetsTalk, Nextel, SouthernLINC
Wireless, Wirefly, TELUS





BlackBerry Smartphones: Differences Between Devices

- Although RIM offers a wide variety of BlackBerry devices, not all of them are marketed in the same location
- Differences between models include
 - service provider
 - memory size
 - messaging functionality
 - push-to-talk functionality



BlackBerry-Enabled Devices: Overview

- They are non-BlackBerry devices
 - Manufactured by other vendors



- These devices can take advantage of BlackBerry technologies
 - BlackBerry Internet Service
 - BlackBerry Enterprise Server
 - BlackBerry Desktop Redirector
- Run non-BlackBerry OS
 - Supported OS: Palm OS, Symbian OS, Windows Mobile



BlackBerry-Enabled Devices: BlackBerry Connect

- To support BlackBerry technology on non-BlackBerry devices, BlackBerry Connect must be installed
 - It is a software that connects devices to BlackBerry Internet Service (BIS) and BlackBerry Enterprise Server (BES)
- Advantage
 - Provides broader selection of devices
 - Satisfies strict security and manageability requirements (not offered through regular BlackBerry devices)



Understanding BlackBerry Technologies

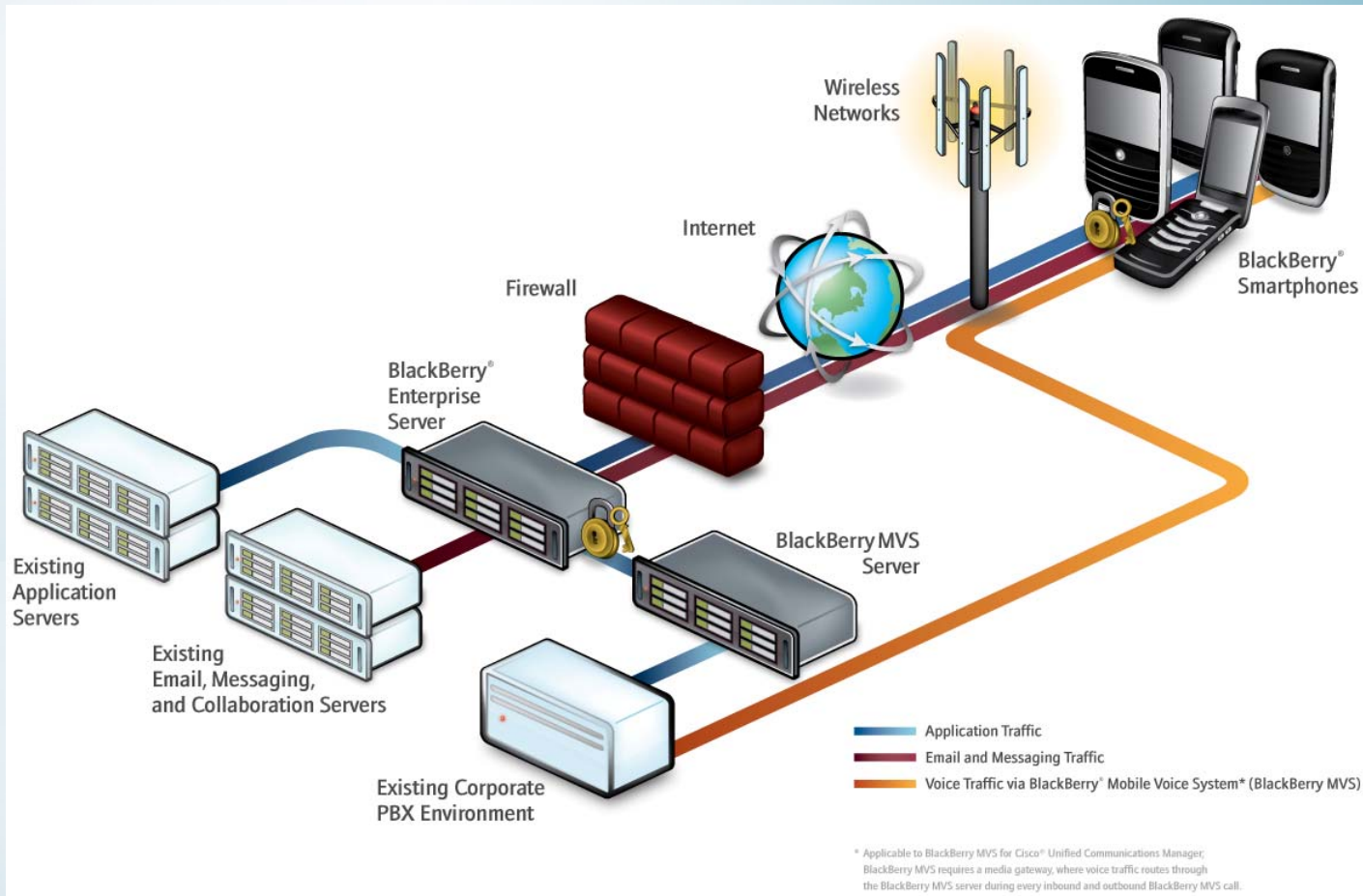


Limitations using Mobile Devices

- Apart from the physical limitations of mobile devices (i.e. screen size, memory, etc.), there are other major limitation
 - **Ubiquitous access to email, calendar events, tasks, etc.**
- RIM developed a solution to solve this problem by enabling its systems to *“push”* email out to BlackBerry devices



BlackBerry Services Architecture: Overview



<http://na.blackberry.com/eng/atagance/solutions/architecture.jsp>



BlackBerry Enterprise Server (BES)

- **Enable wireless users to access**
 - **email,**
 - **corporate data,**
 - **instant messaging,**
 - **phone,**
 - **Internet,**
 - **MMS,**
 - **SMS, and**
 - **calendar organizers**



BlackBerry Enterprise Server (BES) Email Delivery

- BlackBerry handhelds are integrated into email systems using the BES package
- BES supports multiple email systems including
 - Lotus Domino
 - Microsoft Exchange
 - Novell GroupWise
- Some organizations install BES on their own network while others provide hosted BES solutions



BlackBerry Enterprise Server (BES) Email Delivery (continued)

- Each BlackBerry has an identifier called the BlackBerry PIN
- BES provides ubiquitous access to email accounts (i.e. acts as email relay)
- BES continuously monitors the “inbox” of email accounts and when a new message arrives, it passes it to RIM’s *Network Operation Center (NOC)*
- NOC then relays the message to the wireless service provider which in turn delivers the email message to the BlackBerry device



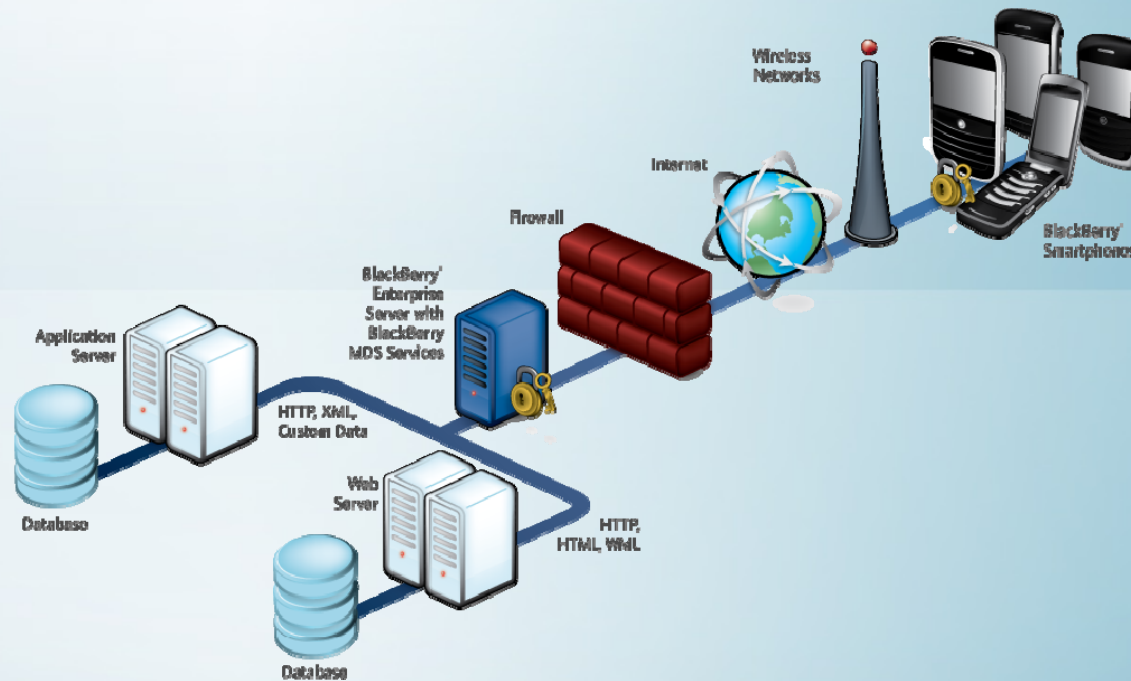
BlackBerry Enterprise Server (BES) Pushes Email

- BES is used to “push email” messages out to BlackBerry devices automatically
 - This also includes contacts, calendar events, etc.
- BES also supports polling email
 - Users can access email offline. When a connection becomes available, BES sends the latest data
- BES also provides TCP/IP connectivity through a component called Mobile Data System (MDS)



BlackBerry Mobile Data System (MDS)

- Enables custom application development based on Sun Microsystems Java ME platform
- Devices must have MDS Runtime installed



<http://na.blackberry.com/eng/services/mobile.jsp>

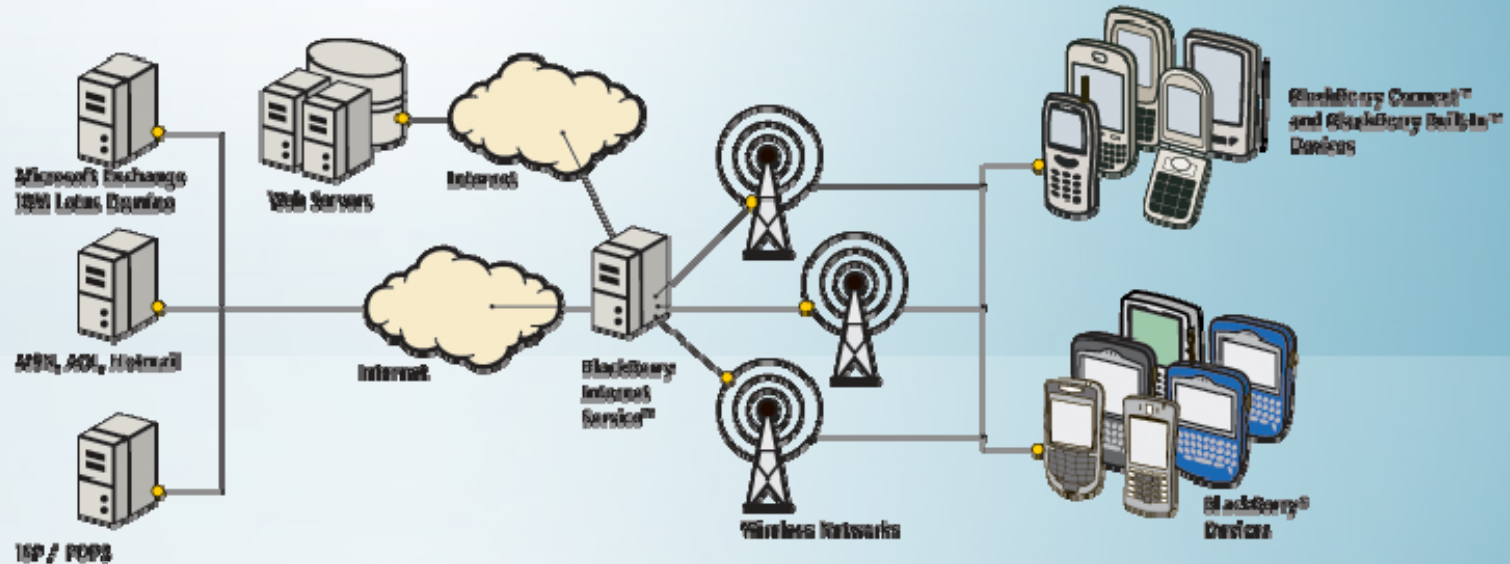


BlackBerry Internet Service (BIS)

- BIS is an alternative solution to the BES
- BES is intended for organizations who wish to use the push technology on their networks
- However, BIS offers access to Internet, email accounts (i.e. POP/IMAP/Outlook Web Access) without connecting through BES
- Mobile service providers run this service (using BIS) to utilize the push technology for real-time access to email, calendar events, etc.
 - i.e. used to access Hotmail, GMail, Yahoo! Mail, etc.



BlackBerry Internet Service (BIS) (continued)



<http://na.blackberry.com/eng/developers/started/solutions.jsp>



BlackBerry Web Signals

- **October 2008: RIM introduced the Web Signal technology**
- **The main aim of this technology is to enable third part content providers to take advantage of the BlackBerry's push technology**
- **Web Signals enables content providers to automatically notify BlackBerry users when relevant content is published (i.e. news, weather, etc.)**
- **Advantages:**
 - **Personalization**
 - **Less time to retrieve relevant information**



Building Applications for BlackBerry Devices



BlackBerry: Standards-based Platform and Developer Tools

- **Java development tools**
 - Industry-standard Java Platform
 - Enterprise Java Edition (Java EE)
 - Integration with Microsoft's .NET technology
- **Support for email, database, Web and application servers**
 - **Email servers**
 - Microsoft Exchange
 - IBM Lotus Domino
 - Novell GroupWise



Building Applications for BlackBerry Devices

- BlackBerry devices provide a wide range of applications and services
- BlackBerry devices provides a standard-based platform for development and deploying wireless applications



BlackBerry Simulators

- When building mobile Web applications, developers should review how they will appear on mobile devices
- BlackBerry simulators provide a representation of the real BlackBerry devices
 - BlackBerry simulators run on Windows OS
 - In order to simulate browsing or email capabilities, the following items are required
 - BlackBerry Java Development Environment (BlackBerry JDE)
 - MDS Simulator, and
 - Email Server Simulator



MDS and Email Simulators

- **MDS Simulator** enables BlackBerry simulators to send/receive content to/from the Internet
 - i.e. push content to BlackBerry devices by using an email address
- **Email Simulator** enables BlackBerry simulators to receive real email messages
 - Used to test applications when BlackBerry devices receive emails



Preparing the BlackBerry Simulation Environment



Requirements for this Lecture

- Web scripting knowledge (i.e. ColdFusion) *



[Download trial version](#)

- BlackBerry Email and MDS Services Simulators 4.1.4
- BlackBerry Curve 8800 Simulator or BlackBerry Storm 9530 Simulator

** ColdFusion is used in this lecture for demonstration purposes. However, the examples can be applied in any other scripting language such as PHP, JSP, ASP, etc.*



ColdFusion 7 or 8

- Run ColdFusion Administrator



CF
ADOBE® COLD FUSION® 8 ADMINISTRATOR

User name

Password

Login

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BlackBerry Email and MDS Services Simulators 4.1.4

- Run Email and MDS Services

```
C:\WINDOWS\system32\cmd.exe
Oct 11, 2008 3:22:19 PM org.apache.catalina.core.ApplicationContext log
INFO: AdministrationController (Status):init
Oct 11, 2008 3:22:19 PM org.apache.catalina.core.ApplicationContext log
INFO: C:\Program Files\Research In Motion\BlackBerry Email and MDS Services Simulators 4.1.4\MDS
Oct 11, 2008 3:22:19 PM org.apache.catalina.core.ApplicationContext log
INFO: AdministrationController (Statistics):init
Oct 11, 2008 3:22:19 PM org.apache.catalina.core.ApplicationContext log
INFO: C:\Program Files\Research In Motion\BlackBerry Email and MDS Services Simulators 4.1.4\MDS
Oct 11, 2008 3:22:20 PM org.apache.coyote.http11.Http11BaseProtocol init
INFO: Initializing Coyote HTTP/1.1 on http-8080
Oct 11, 2008 3:22:20 PM org.apache.coyote.http11.Http11BaseProtocol start
INFO: Starting Coyote HTTP/1.1 on http-8080
<2008-10-11 15:22:20.176 EDT>:[39]:<MDS-CS_MDS>:<DEBUG>:<LAYER = SCM, Web Server Started>
<2008-10-11 15:22:25.536 EDT>:[40]:<MDS-CS_MDS>:<DEBUG>:<LAYER = SCM, EVENT = Expire records from device storage that are expired or older than 0 hours; 0>
<2008-10-11 15:22:25.536 EDT>:[41]:<MDS-CS_MDS>:<DEBUG>:<LAYER = SCM, EVENT = Expire records process ended; 0>
<2008-10-11 15:22:25.536 EDT>:[42]:<MDS-CS_MDS>:<DEBUG>:<LAYER = SCM, EVENT = The push service is ready to receive requests>
<2008-10-11 15:22:25.536 EDT>:[43]:<MDS-CS_MDS>:<DEBUG>:<LAYER = SCM, EVENT = Admin. Task- pending push messages>
```

It is important to have the proper Java JDK version running to properly launch the simulator.



BlackBerry Simulators

- Run BlackBerry Simulators



Curve 8800



Storm 9530



Dynamic Mobile Web Applications Development using ColdFusion



ColdFusion Overview: CFML

- HTML and ColdFusion tags exist together within a document
- ColdFusion documents are saved with **.cfm** extension
 - ColdFusion server recognizes and interprets files that use the ColdFusion Markup Language (CFML)
- All ColdFusion tags begin with **<cf**
- ColdFusion server processes any information between these tags and returns the corresponding HTML



ColdFusion Overview: CFML (continued)

- All **text** is considered **literal** except it is within **pound (#)** sign
- **Tags** are **NOT** case sensitive
- **CFML** tags can accept **attributes** and **values**
 - **Attributes** enable the passing of values for further processing
 - **Tags** can accept required and optional attributes



ColdFusion Comments Example

- CFM comment delimiters
 - `<!-- ColdFusion comments ... -->`
 - Similar to HTML, but they have three dashes, not two
- Example

```
1 <html>
2 </head>
3 <!-- Welcome to ColdFusion Example --->
4 <body>
5 </body>
6 </html>
```



Defining Variables in ColdFusion: <cfset>

- To define CFM variables, <cfset> is used
- To output values of CFM variables, <cfoutput> is used

```
1 <html>
2 </head>
3 <cfset myvar="This is my first CFM Example!">
4 <cfoutput>#myvar#</cfoutput>
5 <body>
6 </body>
7 </html>
```



This is my first CFM Example!



Defining Variables in ColdFusion: <cfset> (continued)

- Removing # sign will treat myvar as regular text

```
1 <html>
2 </head>
3 <cfset myvar="This is my first CFM Example!">
4 <cfoutput>myvar</cfoutput>
5 <body>
6 </body>
```



myvar



Defining Variables in ColdFusion `<cfparam>`

- `<cfparam>` is another way of defining variables in ColdFusion
- However, `cfparam` checks to see whether if a certain variable already exists or not
 - If not, it creates the variables and automatically assigns a default value (initializes variables)



Defining Variables in ColdFusion <cfparam> (continued)

- Using cfparam, one can associate data types, name, ranges, default value, etc.

- Example:**

```
<html>
<body>
<cfparam name="myvar" default="80" min="0" max="100" type="integer">
The value of my variable is: <cfoutput>#myvar#</cfoutput>.
</body>
</html>
```

```
1 <html>
2
3 <body>
4 <cfparam name="myvar" default="80" min="0" max="100" type="integer">
5 The value of my variable is: <cfoutput>#myvar#</cfoutput>.
6 </body>
7 </html>
```

The value of my variable is: 80.



Conditional Statements

- if/elseif/else conditional statements are evaluated using ColdFusion built-in conditional processing tags

```
1 <html>
2 <head>
3 <meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
4 <title>IF conditional statement example in CFM</title>
5 </head>
6
7
8 <cfset TotalPurchase = 215 >
9 <cfif TotalPurchase GTE 0 and TotalPurchase LTE 200 >
10 <cfset myMessage = "Your total is #TotalPurchase# plus 15% for shipping." >
11 </cfif>
12 <cfset myMessage = "Your total is #TotalPurchase# plus 10% for shipping." >
13 </cfif>
14
15
16
17 <body>
18 <cfoutput>
19 #myMessage#
20 </cfoutput>
21 </body>
22 </html>
```

→ Your total is 215 plus 10% for shipping.

Operator	Alternative name(s)
IS	EQUAL, EQ
IS NOT	NOT EQUAL, NEQ
CONTAINS	Not available
DOES NOT CONTAIN	Not available
GREATER THAN	GT
LESS THAN	LT
GREATER THAN OR EQUAL	GTE, GE
LESS THAN OR EQUAL	LTE, LE

Adobe.com



Other Common ColdFusion Tags

- **<cfloop>** → Loops for a defined number of times or while a certain condition is true
- **<cfform>** → Used for form handling
- **<cffunction>** → Define custom function
- **<cfswitch>** → Evaluates an expression by processing a control to a matching **<cfcase>**
- **<cfinclude>** → Include other files in current document
- **<cftry>** → Monitors a ColdFusion code block, and attempts to catch any errors or exceptions



<cfloop> Example

- This example prints the text “Hello World” six times within a loop
 - For every iteration, increase the font size by 1

```
1 <html>
2 <body>
3 <cfloop index="i" from="0" to="5">
4 <font size="<cfoutput>#i#</cfoutput>">Hello World</font><br>
5 </cfloop>
6 </body>
7 </html>
```

```
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
```

- Without using <cfoutput>

```
1 <html>
2 <body>
3 <cfloop index="i" from="0" to="5">
4 <font size="#i#">Hello World</font><br>
5 </cfloop>
6 </body>
7 </html>
```

```
Hello World
Hello World
Hello World
Hello World
Hello World
Hello World
```

HTML
→
code

```
1 <html>
2 <body>
3
4 <font size="#i#">Hello World</font><br>
5
6 <font size="#i#">Hello World</font><br>
7
8 <font size="#i#">Hello World</font><br>
9
10 <font size="#i#">Hello World</font><br>
11
12 <font size="#i#">Hello World</font><br>
13
14 <font size="#i#">Hello World</font><br>
15
16 </body>
17 </html>
```



BlackBerry <cfoutput> Example

```
1 <html>
2 <body>
3 <cfparam name="msg" type="string" default="John Doe">
4 <p align="center">
5   <font size="+2" face="Arial, Helvetica, sans-serif" color="#FF0000">Hello <b><cfoutput>#msg#</cfoutput></b></font>
6 </p>
7 <p align="left"><p align="left">
8   <font size="+1" face="Arial, Helvetica, sans-serif">This is my first CFM Example using BlackBerry 8800.</font>
9 </p>
10 </body>
11 </html>
```

Browser

Hello John Doe.

This is my first CFM Example using BlackBerry 8800.

BlackBerry 8800

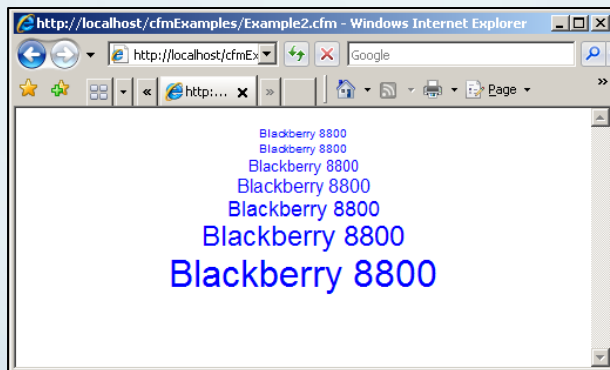




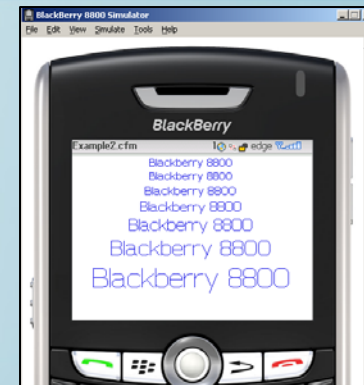
BlackBerry <cfloop> Example

```
1 <html>
2 <body>
3 <cfloop index="i" from="0" to="6">
4 <div align="center">
5   <font face="Arial, Helvetica, sans-serif" color="#0000FF" size="<cfoutput>#i#</cfoutput>">Blackberry 8800</font><br>
6 </div>
7 </cfloop>
8 </body>
9 </html>
```

Browser



BlackBerry 8800





<cfloop> example using different simulators

7130g



Steps for running this example:

1. Save the code (from previous slide) in a file called Example.cfm to where the default Web server location is (i.e. C:\inetpub\wwwroot)
2. Open a Web browser (i.e. Internet Explorer) to test the CFM code by typing the following in the address bar:
<http://servername/Example.cfm>
3. Run BlackBerry Email and MDS Services



<cfloop> example using different simulators (continued)

7130g



4. Locate the BlackBerry simulators (i.e. C:\BlackBerry Simulators\
5. Find a file called 7130g.bat (or equivalent)
6. Run the batch file; the following screen should appear




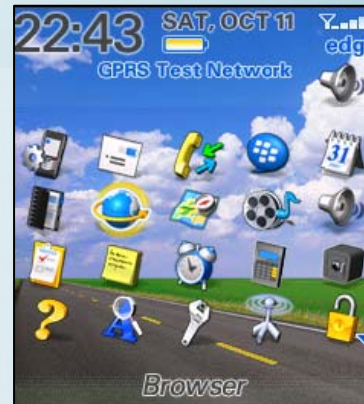


<cfloop> example using different simulators (continued)

7130g



5. Use the Up and Down arrows in the keyboard to scroll to the Menu icon  and press the enter key
6. Scroll down until you reach the Browser icon



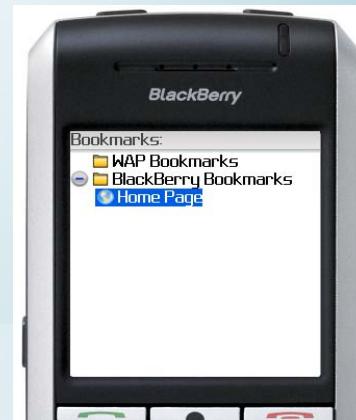


<cfloop> example using different simulators (continued)

7130g



7. The following screen should appear



→ Thumbwheel
→ Escape

8. Click on the Thumbwheel icon and select "Go to"
9. Enter <http://servername/Example.cfm>