WEB ACCESSIBLE MULTIACCOUNT CONFIGURABLE CLIENT EMAIL APPLICATION

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Abstract: The article presents alternative ways of checking emails and how to make an application mail enabled using library of J2EE Platform – JavaMail API. The article describes application attainable from WEB browser based on JSP Scripts and Java servlets. Application allows for access to multiple email accounts through one web page.

Keywords: J2EE, JAVA, JAVAMAIL API, EMAIL.

1. INTRODUCTION

In the late 60's, Ray Tomlinson contributed his research to the invention of a service we know as an electronic mail (e-mail). Nowadays a billion of people from whole world send emails to each other every day. Messages contain not only a plain text, as it was at the beginning, but include images, attachments, documents etc.

The article presents an application, which can access to email box fast and easy from every terminal equipped with web browser.

The JavaMail API provides a set of abstract classes defining objects that comprise a mail system [2]. The API defines classes like Message, Store and Transport. The API can be extended and can be subclassed to provide new protocols and to add functionality when necessary. In addition, the API provides concrete subclasses of the abstract classes. These subclasses, including MimeMessage and MimeBodyPart, implement widely used Internet mail protocols and conform to specifications RFC822 and RFC2045 [1]. They are ready to be used in application development with standards and protocols:

SMTP (Simple Mail Transfer Protocol) is a simple protocol used to send messages through email server to advisable address.

POP (Post Office Protocol) and IMAP (Internet Message Access Protocol) are two various protocol used to receive messages from server. The difference is in what way the messages are managed on the server. POP works with emails received from server. It is a popular protocol but its abilities are limited. IMAP allows creating folders, marking messages, searching for, sending and managing the mailbox directly on server. Because of that, protocol cause more traffic and server load than POP.

MIME (Multipurpose Internet Mail Extensions) is standard for attachments and non-ASCII text in emails. Because POP and SMTP allows for MIME-formatted email, all Internet email comes MIME-formatted so POP clients should also understand and use MIME. IMAP, by design, assumes MIME-formatted email [8].

Developing a tool to deal with e-mail called E-mail Client, which sends and receives text mail as well as receives and sends attachments, works both plain and HTML mode has become the main objective of this article.

In major requirements this client should be accessible from web browser and should have features similar to e-business application (secure, fast, reliable, user friendly). Additionally it differs from existing applications in the way that it allows for accessing any mail account, not only related to the server on which the client is deployed.

2. APPLICATION ARCHITECTURE

Application is based on J2EE platform. It consists of two layers (Fig.1):

- Communication layer, which is an interface between user and core engine layer. Communication layer has been built from JSP scripts and Java servlets
- Core engine layer is based on JavaBeans, which use ready to run tools to interact with
remote email box and to exchange data with database. This database stores data needed to login and basic but necessary information to establish connection with remote box.

3. APPLICATION STRUCTURE

The application consists of JSP scripts and Java servlets. JSP scripts are used as forms; servlets are responsible for data processing and interact with mailbox (Fig. 2). All needed information about users and configuration of application are stored in MySQL database. There are items such as: login and password to access the application, information necessary to check and send messages, role of the user (administrator or regular user).

Servlet login.java takes data from application form loginform.jsp (Fig. 2):

```java
String login = request.getParameter("user");
String pass = request.getParameter("pass");
```

and next using JNDI Resources checks user and password in database (Fig. 3) [5].

If login process was successful servlet db.java reads information about user stored in database and controlling is moved to main controller of application main.java (Fig. 4).

```java
Connection connection = null;
Context initctx = new InitialContext();
Context envCtx = (Context) initctx.lookup("java:comp/env");
DataSource ds = (DataSource)envCtx.lookup("jdbc/AccountsDB");
connection = ds.getConnection();
Statement statement = connection.createStatement();
ResultSet rs = null;
SQLQuery = "SELECT * FROM javamail
WHERE login = " + login + ";"
rs = statement.executeQuery(SQLQuery);
while(rs.next()){
pwd = rs.getString("pass");
}
connection.close();
```

Fig. 1 - Overview of application

Fig. 2 - Login process

Fig. 3 - Part of login.java file

Fig. 4 - Main controller of application

4. SERVLETS CONTAINER

Tomcat implements the servlet and the Java Server Pages (JSP) specifications from Sun Microsystems [5]. That is to say, it provides an environment for Java code to run in cooperation with a web server. Tomcat is a web server that supports servlets and JSPs. Tomcat comes with the Jasper compiler that compiles JSPs into servlets.

The Tomcat servlet engine often appears in combination with an Apache web server or other web servers. Tomcat can also function as an independent web server in it. Earlier in its development, the perception existed that standalone Tomcat was only suitable for development environments and other environments with minimal requirements for speed and transaction handling. However, that perception is no longer true. Tomcat is increasingly being used as a standalone web server, running a large variety of applications.
server in high-traffic, high-availability environments.

The Tomcat server plays in described email client application three major functions. First of all makes the application accessible for registered users, second makes secure connection between client and application using SSL and finally supports communication with database server based on MySQL [7,9]. Configurations examples are introduced on Fig. 5 and Fig. 6.

Application server Jakarta Tomcat is intermediate layer between client using WWW browser and application layer. Tomcat can be a standalone WWW server or can co-operate with the other servers like Apache, which may work with static part of service. That cooperation may in considerably way improve speed of all service. Server Tomcat makes possible to use SSL protocol, can also restrict access to server’s resources or support access to exterior resources (JNDI Resources, JDBC DataSources).

```xml
<Resource name="jdbc/AccountsDB"
  auth="Container"
  type="javax.sql.DataSource"
  maxActive="100" maxIdle="30"
  maxWait="10000"
  username="root"
  password="pass_to_DB"
  driverClassName="com.mysql.jdbc.Driver"
```

**Fig. 5 - Part of Tomcat’s configuration file – server.xml**

```xml
<resource-ref>
  <res-ref-name>jdbc/AccountsDB</res-ref-name>
  <res-type>javax.sql.DataSource</res-type>
  <init-param
    driver-name="com.mysql.jdbc.Driver"/>
  <init-param user="root"/>
  <init-param password="pass_to_DB "/>
  <init-param max-connections="20"/>
  <init-param max-idle-time="30"/>
</resource-ref>
```

**Fig. 6 - Part of Application’s configuration file – web.xml**

5. SECURITY

In this kind of applications safety needs to be considering as secure connection between client and application server and between email box and application (Fig. 7).

“SSL, or Secure Socket Layer, is a technology which allows web browsers and web servers to communicate over a secured connection. This means that the data being sent is encrypted by one side, transmitted, then decrypted by the other side before processing. This is a two-way process, meaning that both the server and the browser encrypt all traffic before sending out data [3]”.

![Secured connection: browser-App-POP/SMTP Server](Fig. 7)

Tomcat server supports secure communication (over SSL) between web browser and application [3].

JavaMail supports accessing mail servers over secured connections using SSL or TLS. To simplify such access, three new protocols have been added. In addition to the non-SSL JavaMail protocols "imap", "pop3", and "smtp", the protocols "imaps", "pop3s", and "smtps" can be used to connect to the corresponding services using an SSL connection [6].

This SSL/TLS supported in JavaMail works only when JavaMail is used in version of J2SE that includes SSL support (J2SE 1.4 and J2SE 1.5). The SSL support is provided by the JSSE package, which is also available for earlier versions of J2SE.

When using the new protocol names, configuration properties must also use these protocol names. For instance, set the property "mail.smtps.host" to specify the host name of the machine to connect to when using the SMTP protocol over SSL. The Transport.send() method will use the default transport protocol, which remains "smtp". To change the default transport protocol to SMTP over SSL, is necessary to set the property "mail.transport.protocol" to "smtps" (Table 1).

<table>
<thead>
<tr>
<th>Name</th>
<th>Store or Transport</th>
<th>Uses SSL ?</th>
<th>Supports STARTTLS?</th>
</tr>
</thead>
<tbody>
<tr>
<td>imap</td>
<td>store</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>imaps</td>
<td>store</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>pop3</td>
<td>store</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>pop3s</td>
<td>store</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>smtp</td>
<td>transport</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>smtps</td>
<td>transport</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

**Table 1. Names of the supported protocols used in the JavaMail API [1]**
6. WORKING WITH MAILBOX

The JavaMail API supports many different messaging system implementations — different message stores, different message formats, and different message transports. The JavaMail API provides a set of base classes and interfaces that define the API for client applications. Many simple applications will only need to interact with the messaging system through these base classes and interfaces.

To use JavaMail API completely is important to install JavaBeans Activation Framework (JAF). JavaMail API includes lots number of classes. All of them contains in javax.mail.

Class Session defines settings email’s session, configurational parameters for mail server. The object of class the Session serves to management with configurational options such: user’s name and password, or other properties, which can be used by whole application [1].

The default instance is:

```java
Properties props = new Properties();
Session defaultsession = Session.getDefaultInstance(props, authenticator);
```

Object props initializes session, contains default properties and setting environmental variables:

- mail.store.protocol - determining default protocol to fetch the message
- mail.transport.protocol - determining applied protocol for sending the message
- mail.host - defines the name of the mail server
- mail.user - defines the user’s name, which is used at the connection with the mail server
- mail.protocol.host - is determining default name of the mail server protocol

The object of the Authenticator class is second from parameters. It belongs to the javax.mail.Authenticator class, which is used while user’s authorization. Object of this class implements getPasswordAuthentication() method, which contains the name and passwords data.

Using the Authenticator object isn’t obligatory, in that way the other argument is “null”.

```java
Session session = Session.getDefaultInstance(props, null);
```

Class Message is the abstract, defining the group of settings of mail message such: the addresses (the sender, recipient), date of send, subject and content. It contains interface Part which is used to service of content of message and also defines structure, it fetch and set headlines of message. Main part can be divided on smaller, what it is possible to use to sending in different formats message or sending attachments. With regard that it is an abstract class, often is used javax.mail.internet.MimeMessage subclass, which is the representation of electronic message in standard MIME or RFC822.

```java
Message message = new MimeMessage(session);
```

Class javax.mail.Address is an abstract class. JavaMail API possesses subclass for SMTP (InternetAddress) and newsgroups (NewsAddress). The object of class the InternetAddress is the standard Internet address defined in RFC 822.

Example of create the object of Address class:

```java
Address adres = new InternetAddress ("user@dmcs.pl","name surname");
```

Class javax.mail.Store provide connection with mailbox using defined protocol. After establish connection it is possible to get the folder contains messages via object javax.mail.Folder class.

Fig.8 shows part of java code used to fetch messages to local computer. First is important to get the Store object and choose the protocol (pop3, pop3s, imap, imaps), then connect to store (store.connect()) using HOST – pop3 server address, USERNAME – username of mailbox and PASSWORD – password to mailbox. Next step is opening the folder and list folders in the store and list/view messages in a folder:

```java
Folder inbox = store.getFolder("INBOX");
```

Than we should get a message's attributes like e.g.:

```java
String subj = MimeUtility.decodeText(m.getSubject());
```

MimeUtility.decodeText() is used to decode the Mime Message subject line. The mail.mime.decodetext.strict property controls decoding of MIME encoded words.

The MIME specification requires that encoded words start at the beginning of a white space separated word. Some mailers incorrectly include encoded words in the middle of the word.

```java
return the MIME type of a message's content:
String mimeType = m.getContentType();
```

Get a message's content:

```java
Object o = m.getContent();
```

The type of the returned object depends on the type of the actual content. When done, close all open folders and then, the store:

```java
inbox.close(false);
store.close();
```
Developers writing a JavaMail client need to write additional viewers that support some of the basic content types—specifically message/rfc822, multipart/mixed, and text/plain. These are the usual content-types encountered when displaying a Message, and they provide the look and feel of the application. Content developers providing additional data types should refer to the JAF specification that discusses how to create DataContentHandlers and Beans that operate on those contents.

To send email first at all it is necessary to get the Session object and set "props". The "props" Properties file contains mail protocols to use, mail host and port to connect to, username etc. that will be used later to connect to the mail server. It can be blank although you may want to set mail.store.protocol, mail.transport.protocol, mail.host, mail.user and mail.from properties. A new message is created by (Fig. 4):

```java
Message msg = new MimeMessage(sess);
```

Next step is setting message's attributes like: addresses to:, from:, set subject, date of send and set message's content:

```java
msg.setContent(messageText, "iso-8859-2");
```

To create MIME multipart content, first instantiate a MimeMultipart object. The default subtype of a multipart content is "mixed". You can specify other subtypes such as "alternative", "related", "parallel" and "signed".

```java
    MimeBodyPart mbp = new MimeBodyPart("alternative");
    mbp.setText(messageText);
    mbp.setContent(messageText, "iso-8859-2");
```

```java
    Multipart multip = new MimeMultipart();
    multip.addBodyPart(mbp);
```

```java
    mbp = new MimeBodyPart();
    Add BodyPart objects to Multipart object
    multip.addBodyPart(mbp);
```

and other parts:
```java
    multip.addBodyPart(mbp1);
    multip.addBodyPart(mbp2);
```

Finally, set the Multipart object as the message's content:
```java
    msg.setContenu(multip);
```

And send the message:
```java
    Transport.send(msg);
```

Complete procedures of receiving and sending emails using JavaMail API are introduced on Fig. 8 and Fig. 9 respectively.

```java
import javax.mail.*;
import javax.activation.*;
...
Properties props = new Properties();
Session sess = Session.getDefaultInstance(props, null);
Store store = sess.getStore("pop3s");
store.connect(HOST, USERNAME, PASSWORD);
Folder inbox = store.getFolder("INBOX");
    Message m = inbox.getMessage(num);
    String subj = MimeUtility.decodeText(m.getSubject());
    String frm = MimeUtility.decodeText(from.toString());
    String mimeType = m.getContentType();
    Object o = m.getContent();
    if (o instanceof String) {
        // declaration how to process plain messages
    } else if (o instanceof Multipart) {
        Multipart mp = (Multipart)m.getContent();
        for (int i=0; i< mp.getCount(); i++) {
            Part p = mp.getBodyPart(i);
            // declaration how to process multipart messages (attachments)
        }
    } else if (o instanceof InputStream) {
        InputStream is = (InputStream)o;
        int c;
        while ((c = is.read()) != -1) {
            out.write(c);
        }
    }
    inbox.close(false);
    store.close();
```

Fig. 8 - Example of receiving message using JavaMail API

7. CONCLUSIONS

The JavaMail API is designed for multiple purposes. Client, server or middleware developers interested in building mail and messaging applications are using the Java programming language. Application developers who need to "mail-enable" their applications. Service Providers who need to implement specific access and transfer protocols.
import javax.mail.*;
import javax.activation.*;
...
Properties prop = System.getProperties();
prop.put("mail.host","mail2.p.lodz.pl");
prop.put("mail.transport.protocol","smtp");
Session sess = Session.getInstance(prop, null);
Message msg = new MimeMessage(sess);
msg.setContent(messageText, "iso-8859-2");
msg.setSentDate(new Date());
msg.setRecipient(Message.RecipientType.TO,
"email_to@domena.pl");
msg.setFrom("email_from@domena.pl");
msg.setSubject(MimeUtility.encodeText(subject,"iso-
8859-2","Q"));

//below segment if attachment required
MimeBodyPart mbp = new MimeBodyPart();
mbp.setText(messageText);
mbp.setContent(messageText, "iso-8859-2");
Multipart multip = new MimeMultipart();
multip.addBodyPart(mbp);
String FileSource = ("path_to_file");
    FileDataSource FILE = new FileDataSource(FileSource);
    mbp.setDataHandler(new DataHandler("FILE"));
    mbp.setFileName("FILENAME");
multip.addBodyPart(mbp);
msg.setContent(multip);
Transport.send(msg);

Fig.9 - Example of sending message using JavaMail
API

A great advantage of this API is independence
from the system platform of a user. This feature is
more then welcome nowadays in world of business
applications and non-commercial software as well.
The author’s task has been to gather all this tools
together and put them to work as a basic but fully
functional email system.

The most important part is to understand ways of
working JavaMail API and present it using JSP
script or Java servlets, it’s also crucial to find
balance between performance, easy of use and
reliability.

All this process demands from developer to be
familiar with networking issues like Java
programming, using Java Beans, JNDI Resources,
JDBC DataSources, SQL, JavaMail API,
configuring Tomcat Server, e-mail system (protocols
and standards), security.

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