TRIDIUM

NS2022

ACCELERATING INNOVATION

TRIDIUM

Developing Custom Provisioning Steps

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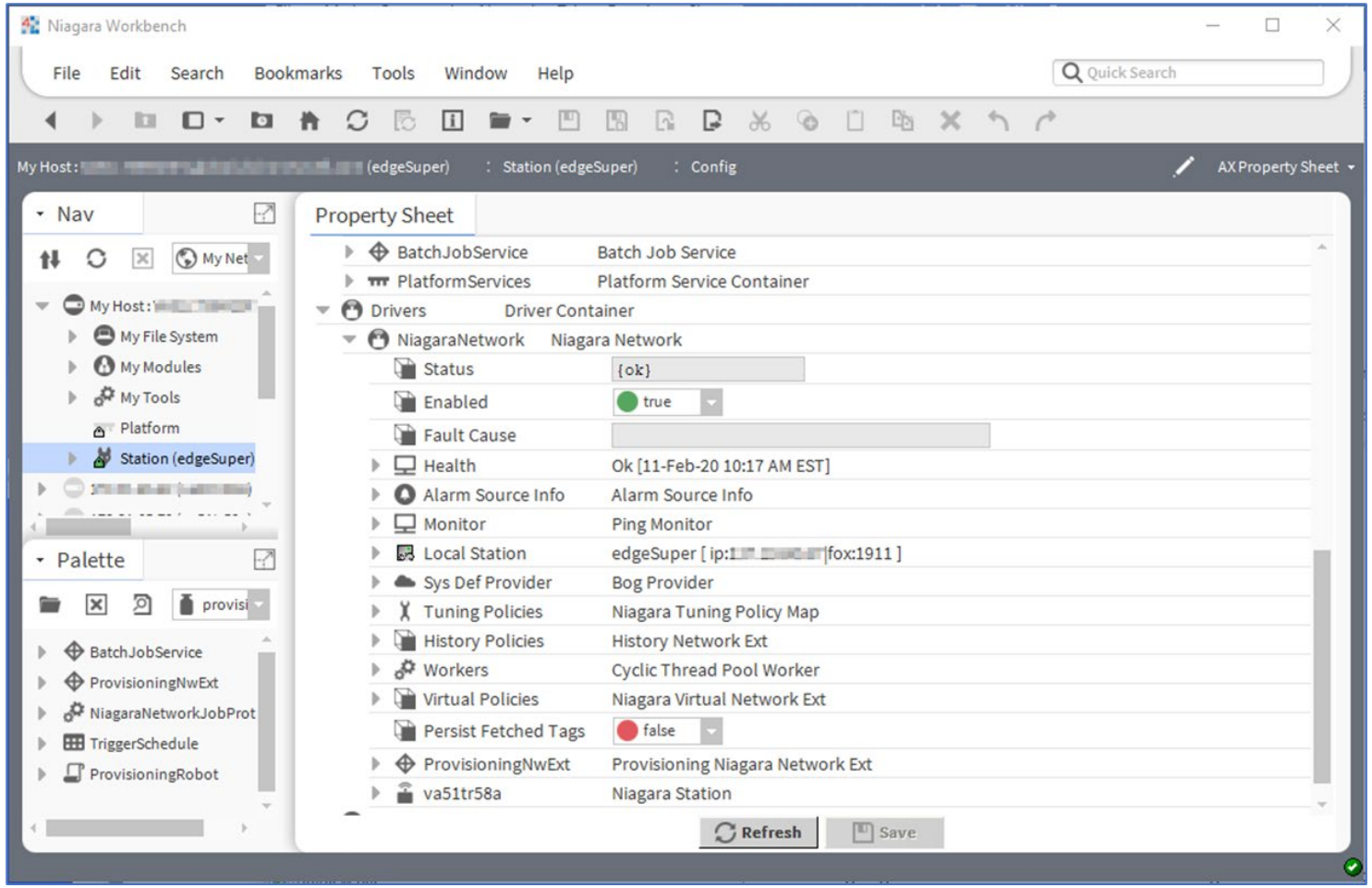
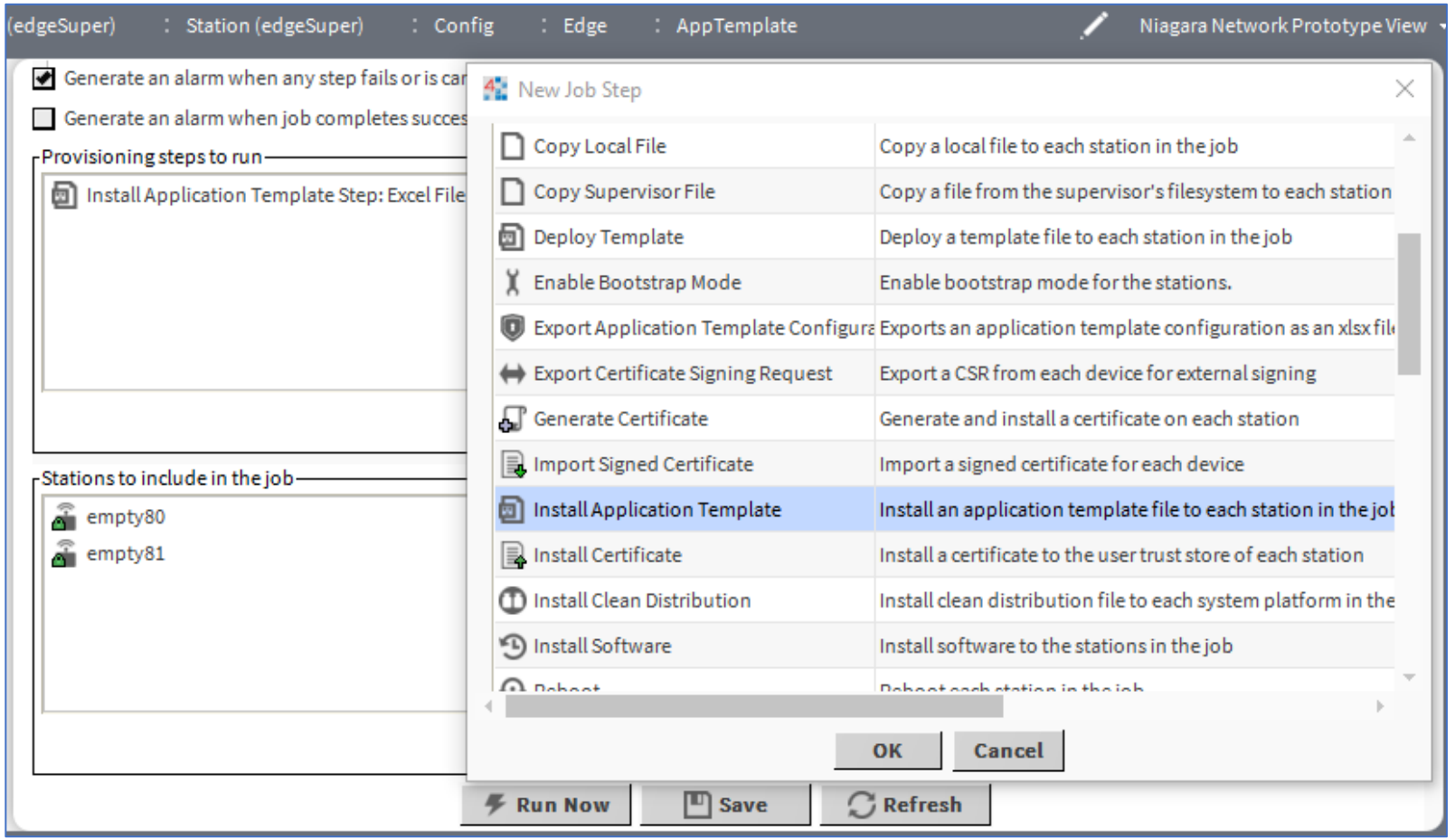
Tridium, Inc.

What is Provisioning?



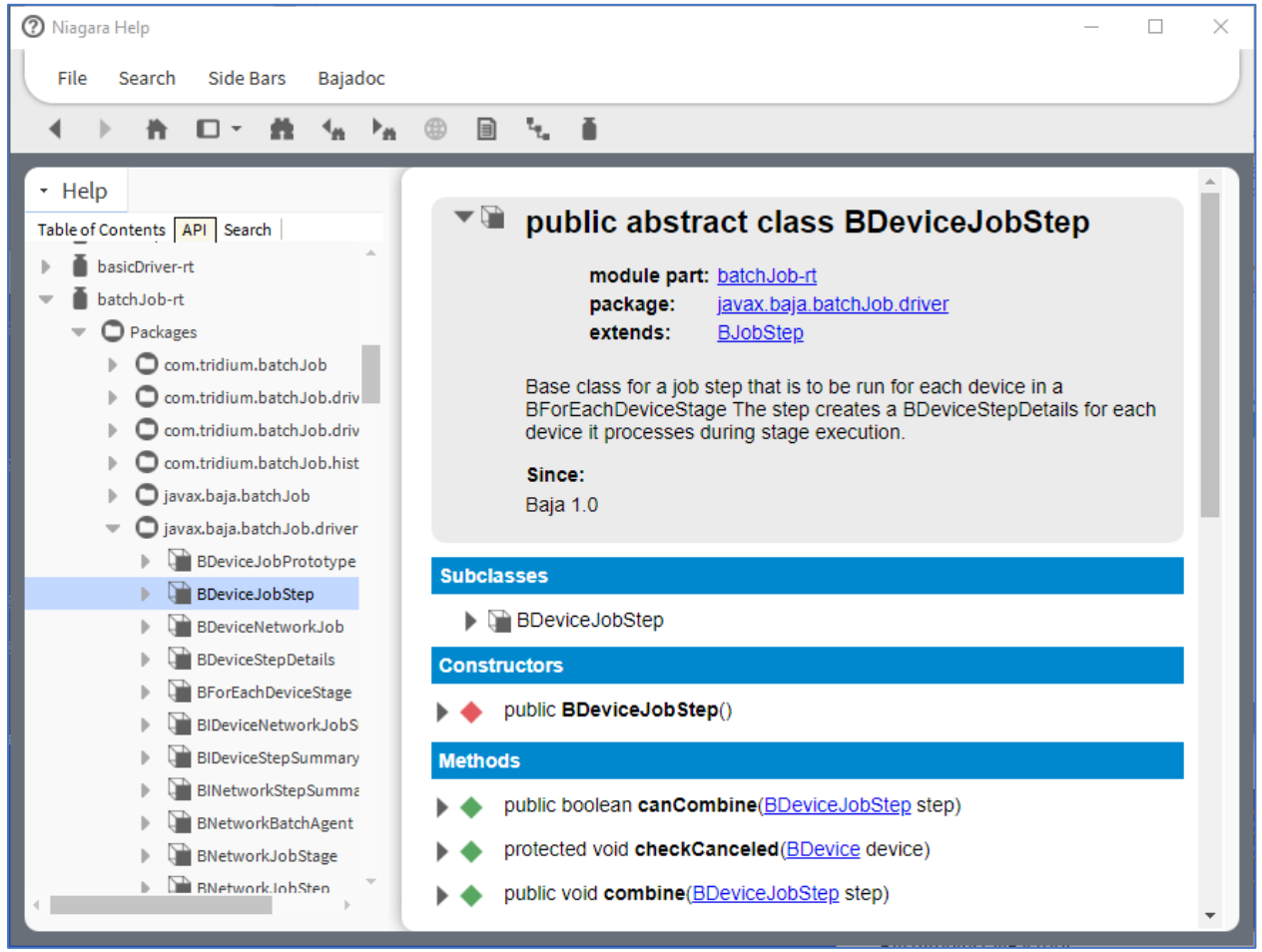
Provisioning Setup on a Supervisor

- Backups
- Software
- Templates
- Credentials
- Certificates
- Licenses
- Etc.



Provisioning Public API

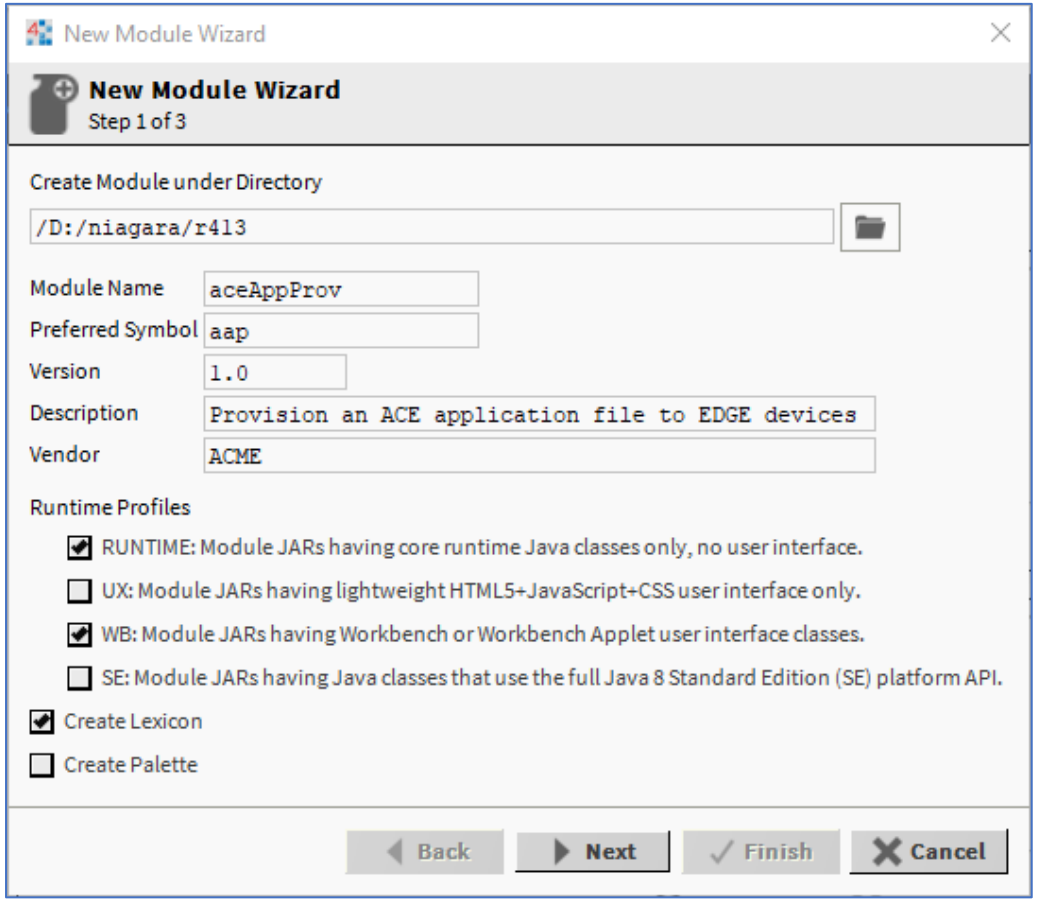
- batchJob-rt
  - BBatchJob
  - BBatchJobService
  - BJobStep
  - BDeviceStepDetails
- provisioningNiagara-wb
  - BStationStepFactory
- batchJob-wb



Extending Provisioning

- Our goal: Install an ACE application on EDGE devices

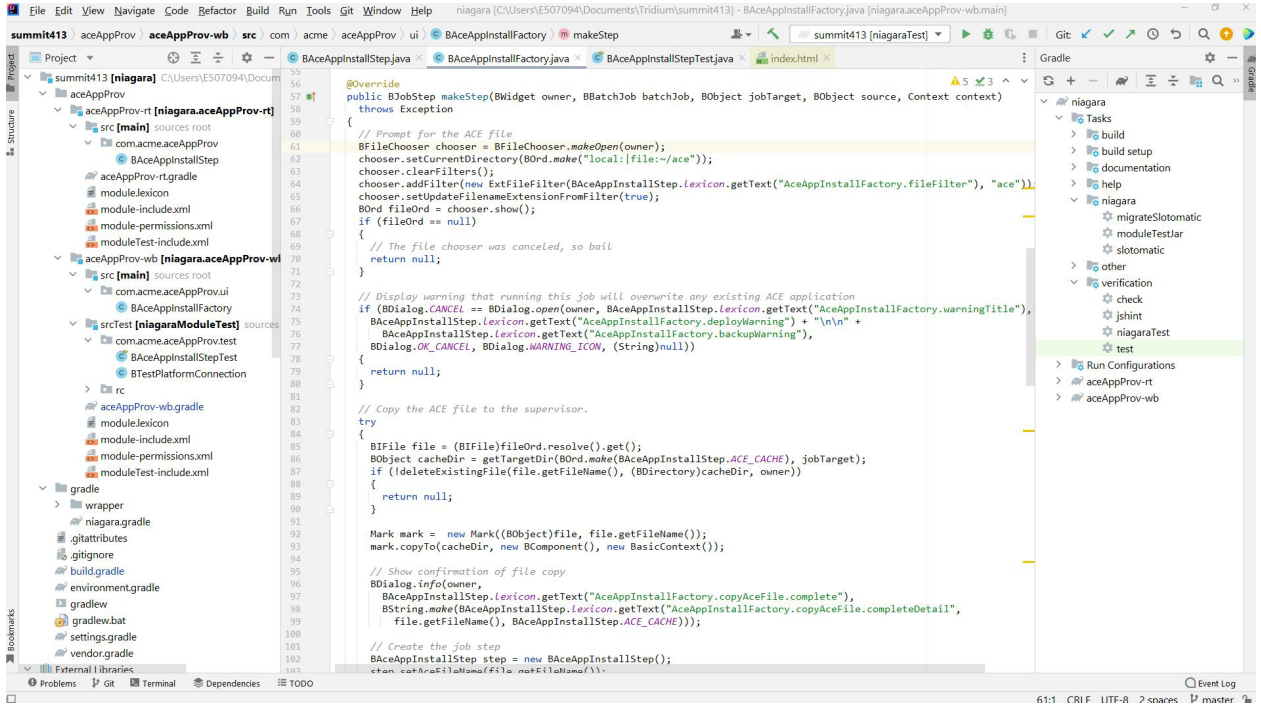
- Create a new module
- Load it into the IDE
- Create classes



Create Classes

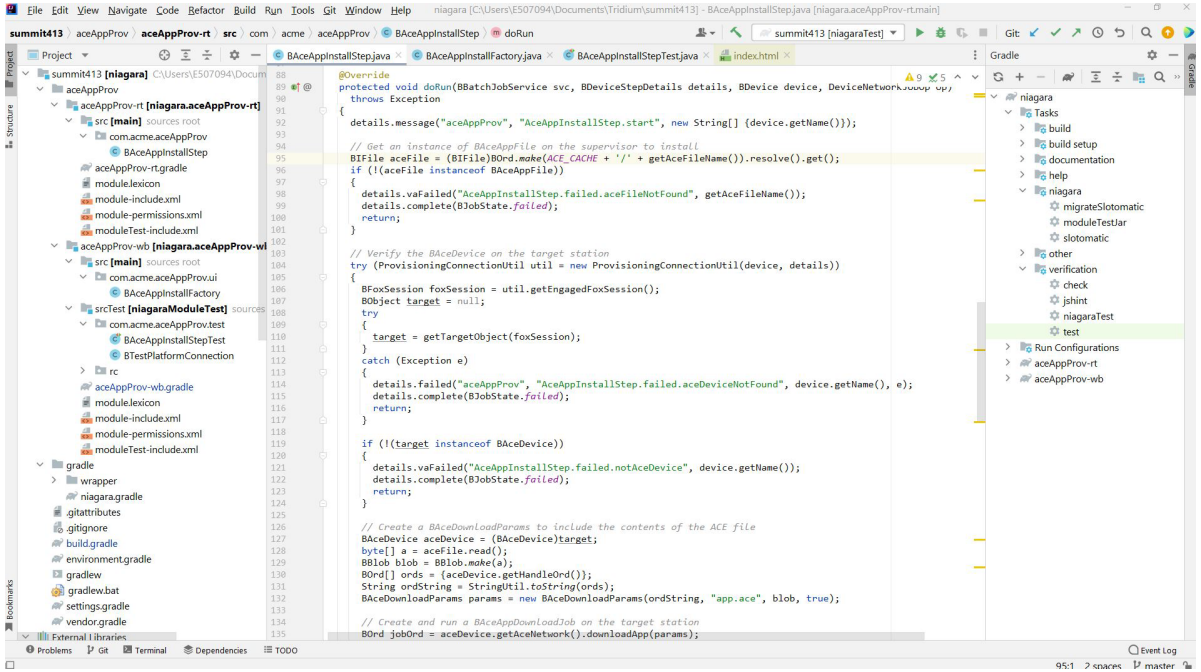
- BAceAppInstallStep
- BAceAppInstallFactory
- BAceAppInstallTest

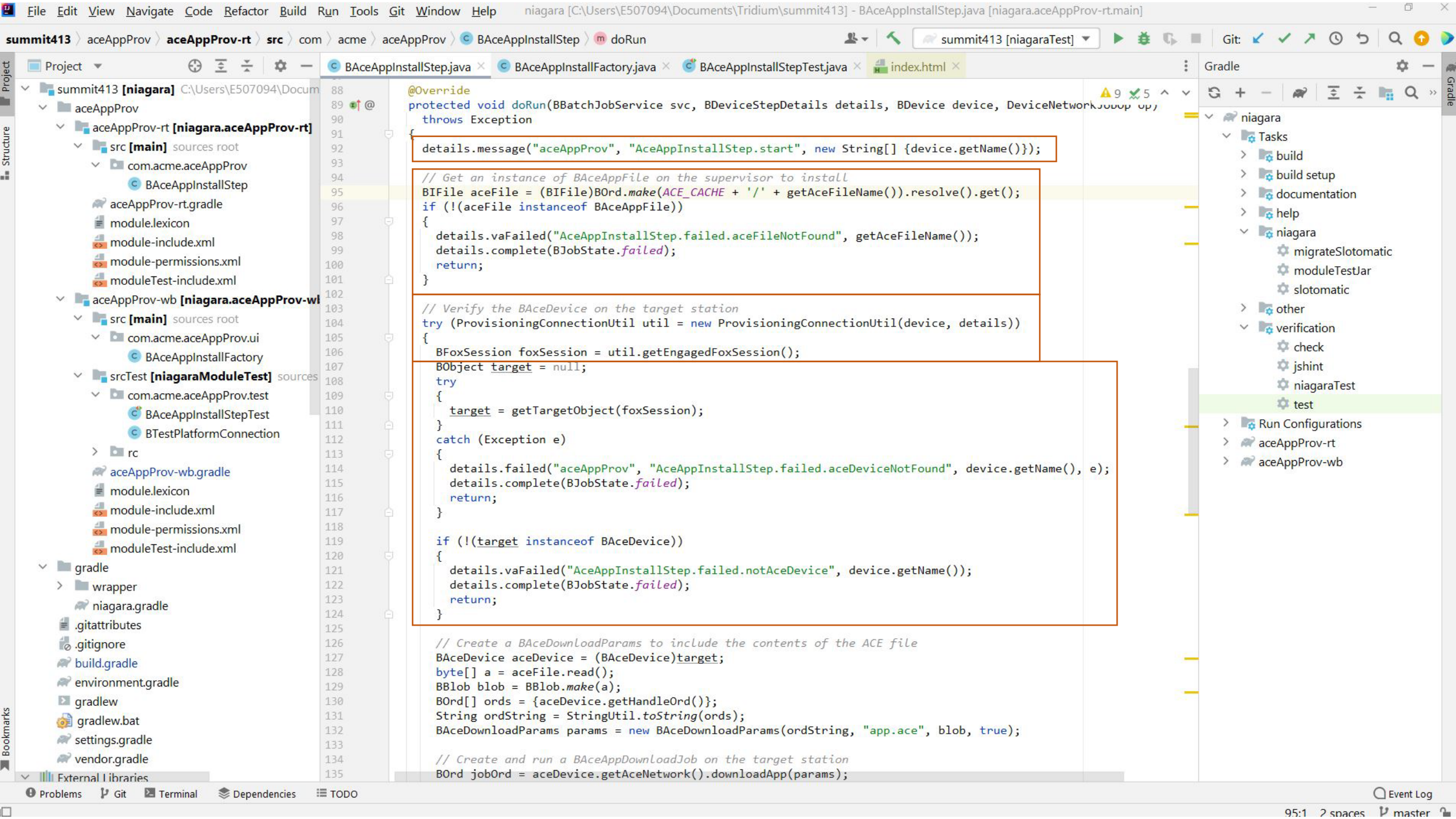
- Niagara annotations
- Base classes
- Method overrides
- Slotomatic



Provisioning Step

- ACE application file on supervisor
- ACE Device component on target station
  - ProvisioningConnectionUtil
- ACE application install
  - Re-use methods available to Workbench




File Edit View Navigate Code Refactor Build Run Tools Git Window Help
niagara [C:\Users\E507094\Documents\Tridium\summit413] - BAceAppInstallStep.java [niagara.aceAppProv-rt.main]
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summit413 [niagaraTest]
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aceAppProv
aceAppProv-rt [niagara.aceAppProv-rt]
src [main] sources root
com.acme.aceAppProv
BAceAppInstallStep
aceAppProv-rt.gradle
module.lexicon
module-include.xml
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moduleTest-include.xml
aceAppProv-wb [niagara.aceAppProv-wb]
src [main] sources root
com.acme.aceAppProv.ui
BAceAppInstallFactory
srcTest [niagaraModuleTest] sources
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BAceAppInstallStepTest
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BAceAppInstallStep.java
BAceAppInstallFactory.java
BAceAppInstallStepTest.java
index.html
@Override
protected void doRun(BBatchJobService svc, BDeviceStepDetails details, BDevice device, DeviceNetworkJobOp op)
throws Exception
{
details.message("aceAppProv", "AceAppInstallStep.start", new String[] {device.getName()});
// Get an instance of BAceAppFile on the supervisor to install
BIFile aceFile = (BIFile)BOrd.make(ACE_CACHE + '/' + getAceFileName()).resolve().get();
if (!(aceFile instanceof BAceAppFile))
{
details.vaFailed("AceAppInstallStep.failed.aceFileNotFound", getAceFileName());
details.complete(BJobState.failed);
return;
}
// Verify the BAceDevice on the target station
try (ProvisioningConnectionUtil util = new ProvisioningConnectionUtil(device, details))
{
BFoxSession foxSession = util.getEngagedFoxSession();
BObject target = null;
try
{
target = getTargetObject(foxSession);
}
catch (Exception e)
{
details.failed("aceAppProv", "AceAppInstallStep.failed.aceDeviceNotFound", device.getName(), e);
details.complete(BJobState.failed);
return;
}
if (!(target instanceof BAceDevice))
{
details.vaFailed("AceAppInstallStep.failed.notAceDevice", device.getName());
details.complete(BJobState.failed);
return;
}
// Create a BAceDownloadParams to include the contents of the ACE file
BAceDevice aceDevice = (BAceDevice)target;
byte[] a = aceFile.read();
BBlob blob = BBlob.make(a);
BOrd[] ords = {aceDevice.getHandleOrd()};
String ordString = StringUtil.toString(ords);
BAceDownloadParams params = new BAceDownloadParams(ordString, "app.ace", blob, true);
// Create and run a BAceAppDownloadJob on the target station
BOrd jobOrd = aceDevice.getAceNetwork().downloadApp(params);
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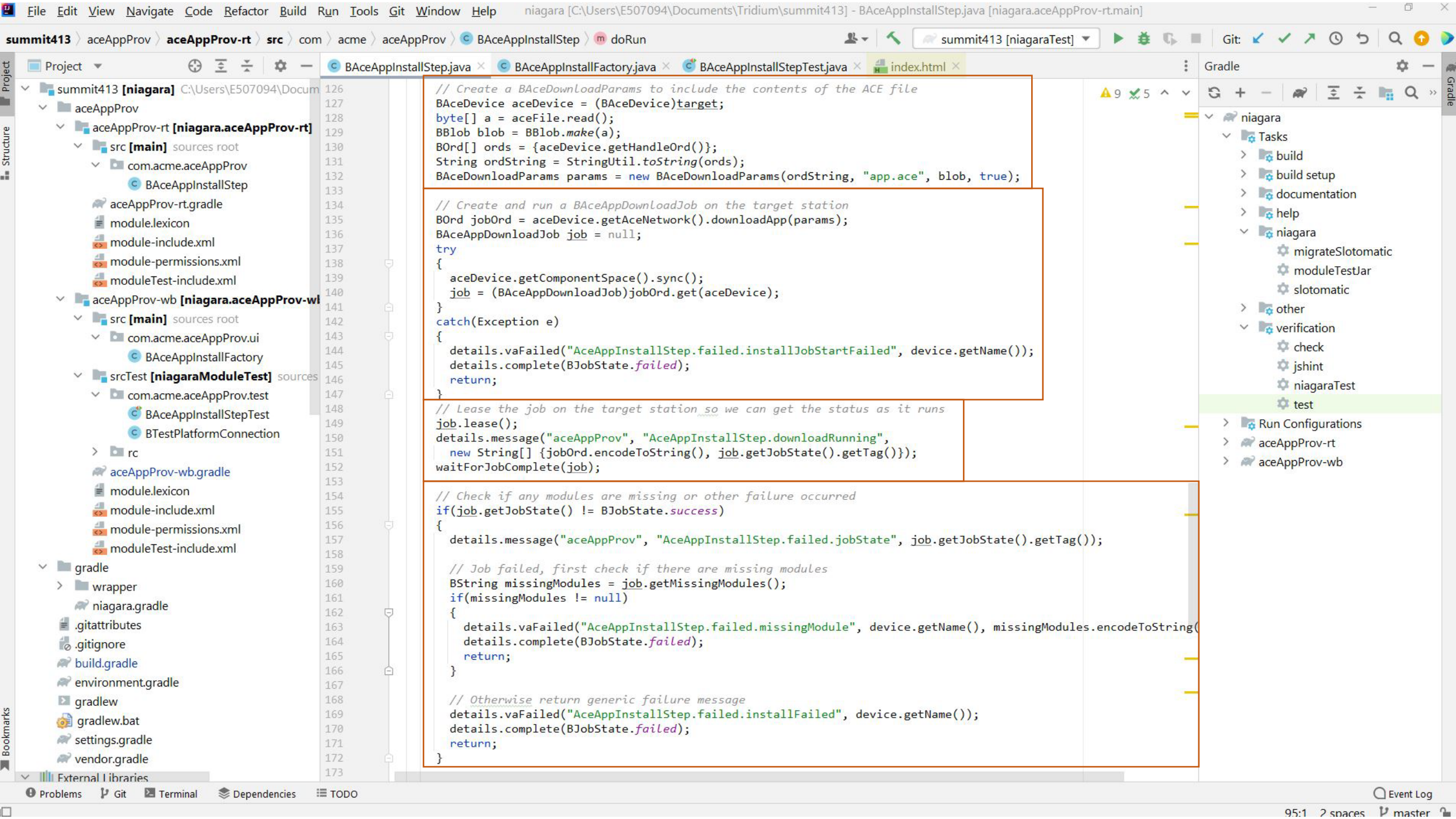
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settings.gradle
vendor.gradle
External Libraries
BAceAppInstallStep.java
BAceAppInstallFactory.java
BAceAppInstallStepTest.java
index.html
126 // Create a BAceDownloadParams to include the contents of the ACE file
127 BAceDevice aceDevice = (BAceDevice)target;
128 byte[] a = aceFile.read();
129 BBlob blob = BBlob.make(a);
130 BOrd[] ords = {aceDevice.getHandleOrd()};
131 String ordString = StringUtil.toString(ords);
132 BAceDownloadParams params = new BAceDownloadParams(ordString, "app.ace", blob, true);
133
134 // Create and run a BAceAppDownloadJob on the target station
135 BOrd jobOrd = aceDevice.getAceNetwork().downloadApp(params);
136 BAceAppDownloadJob job = null;
137 try
138 {
139 aceDevice.getComponentSpace().sync();
140 job = (BAceAppDownloadJob)jobOrd.get(aceDevice);
141 }
142 catch(Exception e)
143 {
144 details.vaFailed("AceAppInstallStep.failed.installJobStartFailed", device.getName());
145 details.complete(BJobState.failed);
146 return;
147 }
148 // Lease the job on the target station so we can get the status as it runs
149 job.lease();
150 details.message("aceAppProv", "AceAppInstallStep.downloadRunning",
151 new String[] {jobOrd.encodeToString(), job.getJobState().getTag()});
152 waitForJobComplete(job);
153
154 // Check if any modules are missing or other failure occurred
155 if(job.getJobState() != BJobState.success)
156 {
157 details.message("aceAppProv", "AceAppInstallStep.failed.jobState", job.getJobState().getTag());
158
159 // Job failed, first check if there are missing modules
160 BString missingModules = job.getMissingModules();
161 if(missingModules != null)
162 {
163 details.vaFailed("AceAppInstallStep.failed.missingModule", device.getName(), missingModules.encodeToString(
164 details.complete(BJobState.failed);
165 return;
166 }
167
168 // Otherwise return generic failure message
169 details.vaFailed("AceAppInstallStep.failed.installFailed", device.getName());
170 details.complete(BJobState.failed);
171 return;
172 }
173
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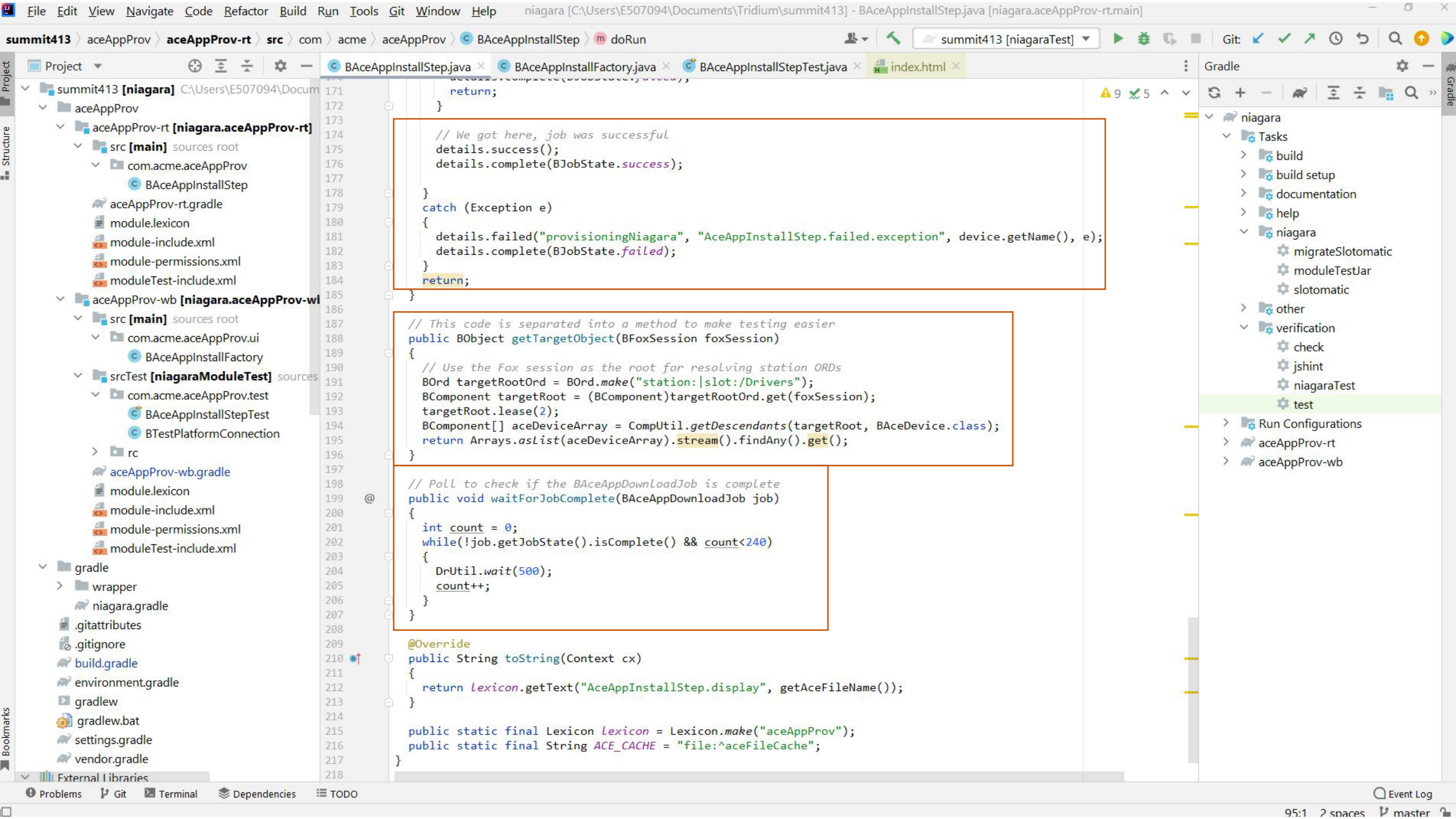
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BAceAppInstallFactory.java
BAceAppInstallStepTest.java
index.html
return;
}
// We got here, job was successful
details.success();
details.complete(BJobState.success);
}
catch (Exception e)
{
details.failed("provisioningNiagara", "AceAppInstallStep.failed.exception", device.getName(), e);
details.complete(BJobState.failed);
}
return;
}
// This code is separated into a method to make testing easier
public BObject getTargetObject(BFoxSession foxSession)
{
// Use the Fox session as the root for resolving station ORDs
BOrd targetRootOrd = BOrd.make("station:|slot:/Drivers");
BComponent targetRoot = (BComponent)targetRootOrd.get(foxSession);
targetRoot.lease(2);
BComponent[] aceDeviceArray = CompUtil.getDescendants(targetRoot, BAceDevice.class);
return Arrays.asList(aceDeviceArray).stream().findAny().get();
}
// Poll to check if the BAceAppDownloadJob is complete
public void waitForJobComplete(BAceAppDownloadJob job)
{
int count = 0;
while(!job.getJobState().isComplete() && count<240)
{
DrUtil.wait(500);
count++;
}
}
@Override
public String toString(Context cx)
{
return lexicon.getText("AceAppInstallStep.display", getAceFileName());
}
public static final Lexicon lexicon = Lexicon.make("aceAppProv");
public static final String ACE_CACHE = "file:^aceFileCache";
}
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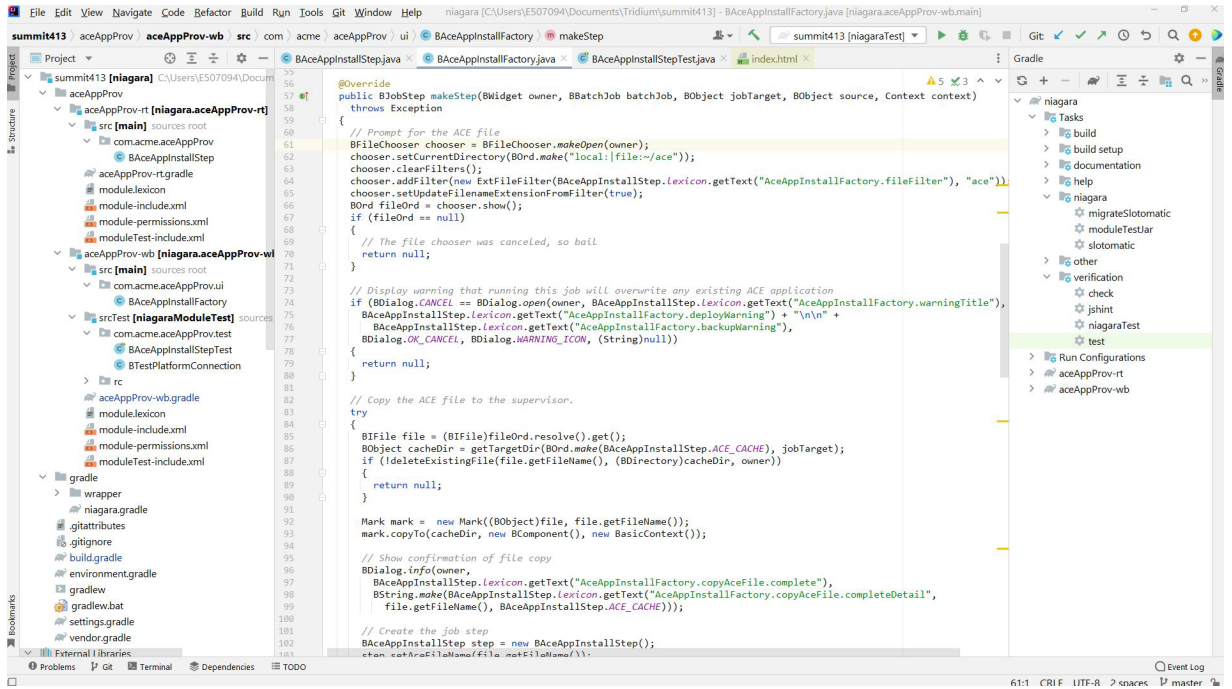
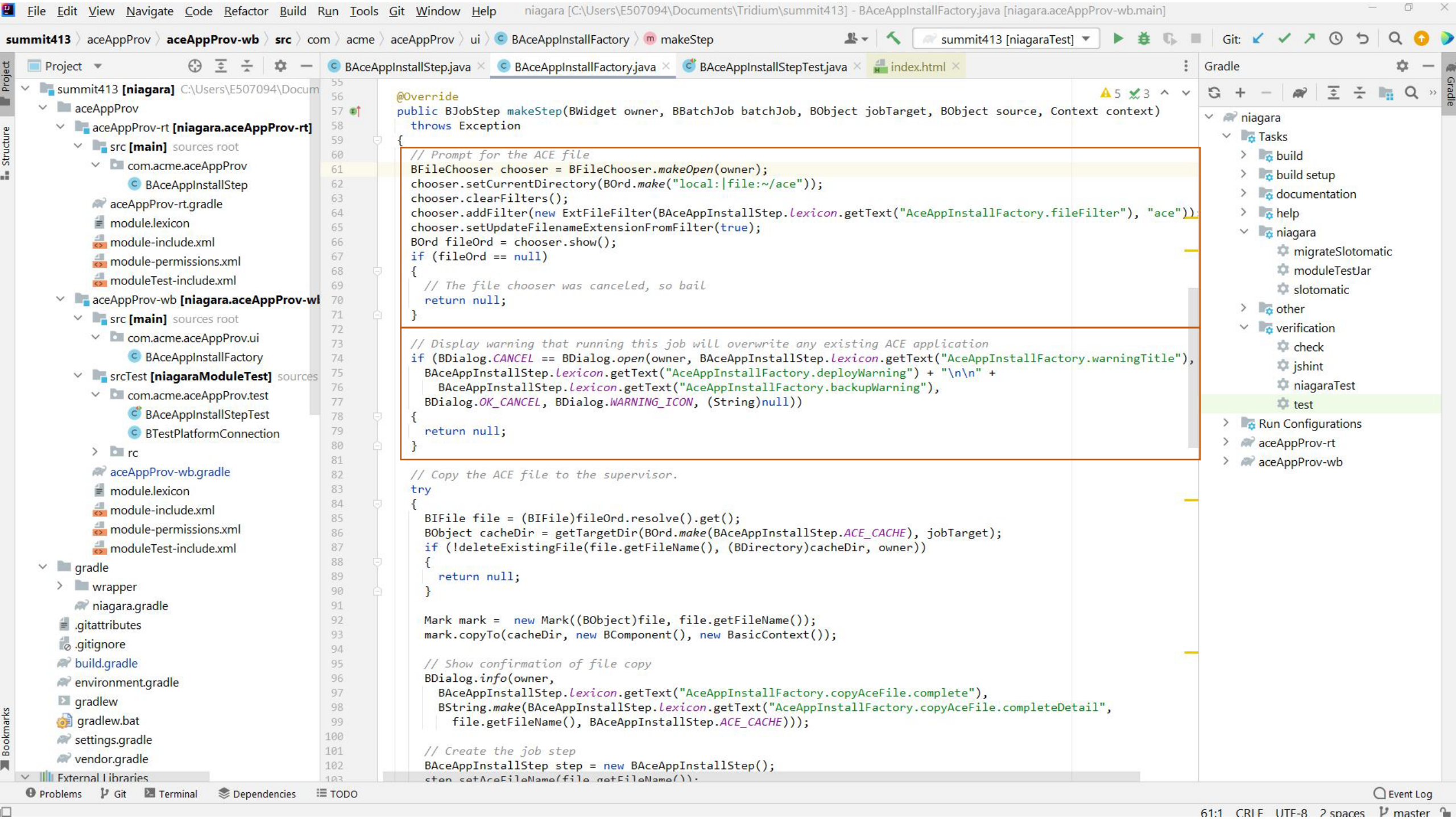
Step Factory

- Select ACE file for installation
- Copy file to supervisor
- Create step component
- Dialogs for user feedback

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niagara [C:\Users\E507094\Documents\Tridium\summit413] - BAceAppInstallFactory.java [niagara.aceAppProv-wb.main]
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aceAppProv
aceAppProv-rt [niagara.aceAppProv-rt]
src [main] sources root
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BAceAppInstallStepTest.java
index.html
@Override
public BJobStep makeStep(BWidget owner, BBatchJob batchJob, BObject jobTarget, BObject source, Context context)
throws Exception
{
// Prompt for the ACE file
BFileChooser chooser = BFileChooser.makeOpen(owner);
chooser.setCurrentDirectory(BOrd.make("local:|file:~/ace"));
chooser.clearFilters();
chooser.addFilter(new ExtFileFilter(BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.fileFilter"), "ace"));
chooser.setUpdateFilenameExtensionFromFilter(true);
BOrd fileOrd = chooser.show();
if (fileOrd == null)
{
// The file chooser was canceled, so bail
return null;
}
// Display warning that running this job will overwrite any existing ACE application
if (BDialog.CANCEL == BDialog.open(owner, BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.warningTitle"),
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.deployWarning") + "\n\n" +
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.backupWarning"),
BDialog.OK_CANCEL, BDialog.WARNING_ICON, (String)null))
{
return null;
}
// Copy the ACE file to the supervisor.
try
{
BIFile file = (BIFile)fileOrd.resolve().get();
BObject cacheDir = getTargetDir(BOrd.make(BAceAppInstallStep.ACE_CACHE), jobTarget);
if (!deleteExistingFile(file.getFileName(), (BDirectory)cacheDir, owner))
{
return null;
}
Mark mark = new Mark((BObject)file, file.getFileName());
mark.copyTo(cacheDir, new BComponent(), new BasicContext());
// Show confirmation of file copy
BDialog.info(owner,
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.copyAceFile.complete"),
BString.make(BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.copyAceFile.completeDetail",
file.getFileName(), BAceAppInstallStep.ACE_CACHE)));
// Create the job step
BAceAppInstallStep step = new BAceAppInstallStep();
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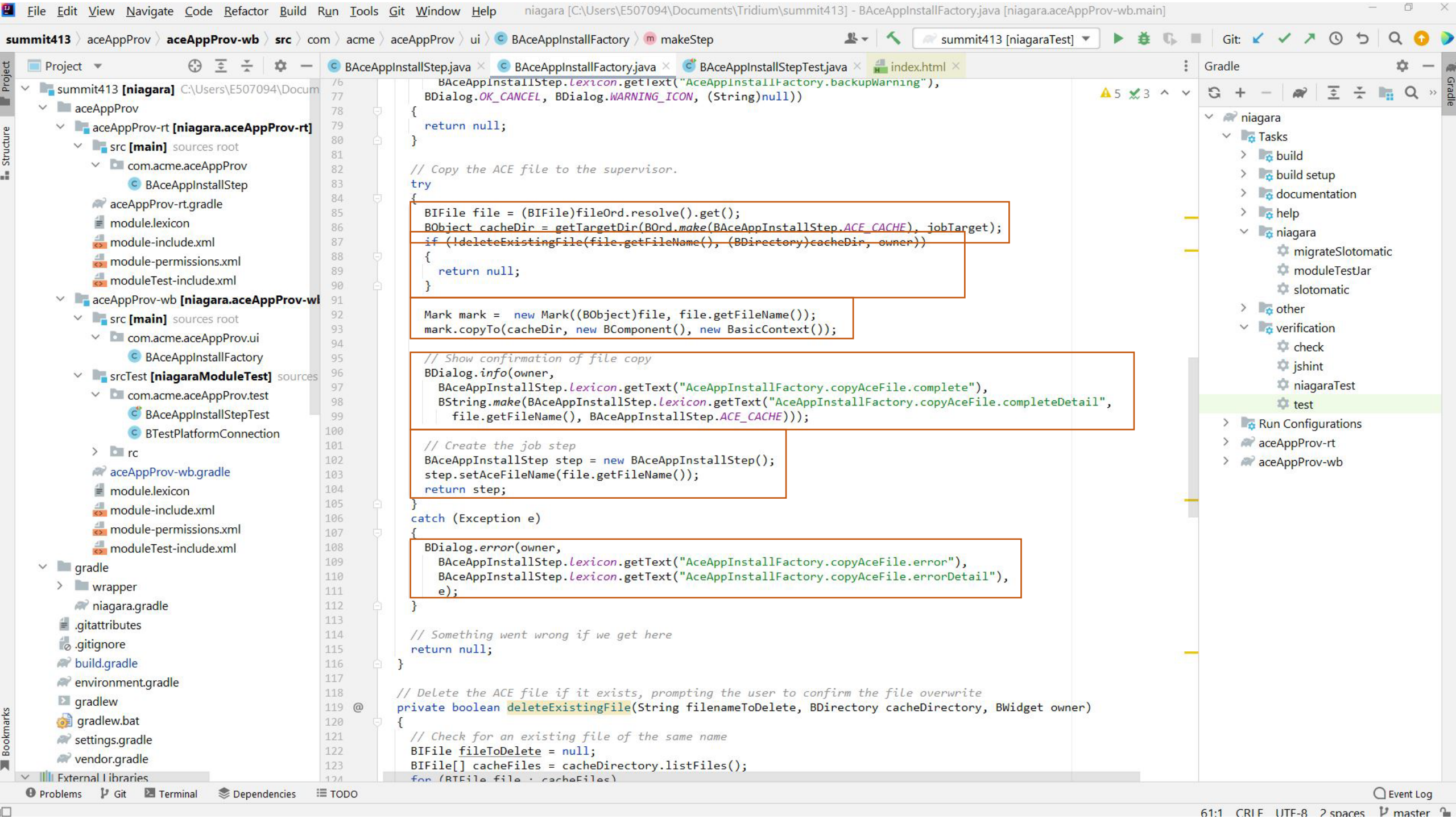
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BAceAppInstallFactory.java
BAceAppInstallStepTest.java
index.html
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.backupWarning"),
BDialog.OK_CANCEL, BDialog.WARNING_ICON, (String)null))
{
return null;
}
// Copy the ACE file to the supervisor.
try
{
BIFile file = (BIFile)fileOrd.resolve().get();
BObject cacheDir = getTargetDir(BOrd.make(BAceAppInstallStep.ACE_CACHE), jobTarget);
if (!deleteExistingFile(file.getFileName(), (BDirectory)cacheDir, owner))
{
return null;
}
Mark mark = new Mark((BObject)file, file.getFileName());
mark.copyTo(cacheDir, new BComponent(), new BasicContext());
// Show confirmation of file copy
BDialog.info(owner,
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.copyAceFile.complete"),
BString.make(BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.copyAceFile.completeDetail",
file.getFileName(), BAceAppInstallStep.ACE_CACHE)));
// Create the job step
BAceAppInstallStep step = new BAceAppInstallStep();
step.setAceFileName(file.getFileName());
return step;
}
catch (Exception e)
{
BDialog.error(owner,
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.copyAceFile.error"),
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.copyAceFile.errorDetail"),
e);
}
// Something went wrong if we get here
return null;
}
// Delete the ACE file if it exists, prompting the user to confirm the file overwrite
private boolean deleteExistingFile(String filenameToDelete, BDirectory cacheDirectory, BWidget owner)
{
// Check for an existing file of the same name
BIFile fileToDelete = null;
BIFile[] cacheFiles = cacheDirectory.listFiles();
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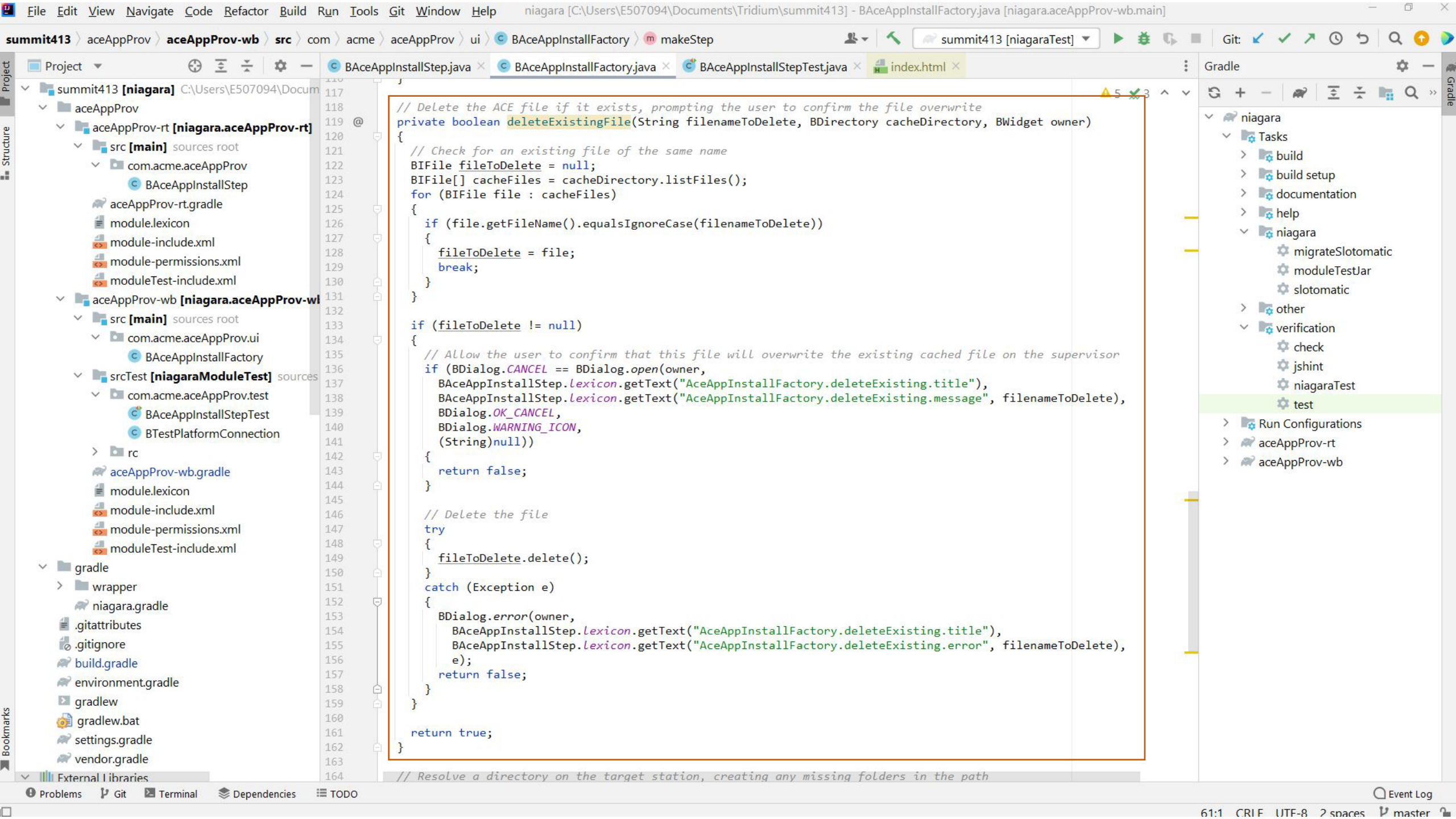
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gradlew
gradlew.bat
settings.gradle
vendor.gradle
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BAceAppInstallFactory.java
BAceAppInstallStepTest.java
index.html
// Delete the ACE file if it exists, prompting the user to confirm the file overwrite
private boolean deleteExistingFile(String filenameToDelete, BDirectory cacheDirectory, BWidget owner)
{
// Check for an existing file of the same name
BIFile fileToDelete = null;
BIFile[] cacheFiles = cacheDirectory.listFiles();
for (BIFile file : cacheFiles)
{
if (file.getFileName().equalsIgnoreCase(filenameToDelete))
{
fileToDelete = file;
break;
}
}
if (fileToDelete != null)
{
// Allow the user to confirm that this file will overwrite the existing cached file on the supervisor
if (BDialog.CANCEL == BDialog.open(owner,
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.deleteExisting.title"),
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.deleteExisting.message", filenameToDelete),
BDialog.OK_CANCEL,
BDialog.WARNING_ICON,
(String)null))
{
return false;
}
// Delete the file
try
{
fileToDelete.delete();
}
catch (Exception e)
{
BDialog.error(owner,
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.deleteExisting.title"),
BAceAppInstallStep.lexicon.getText("AceAppInstallFactory.deleteExisting.error", filenameToDelete),
e);
return false;
}
}
return true;
}
// Resolve a directory on the target station, creating any missing folders in the path
Gradle
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moduleTestJar
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aceAppProv-rt
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Problems
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TODO
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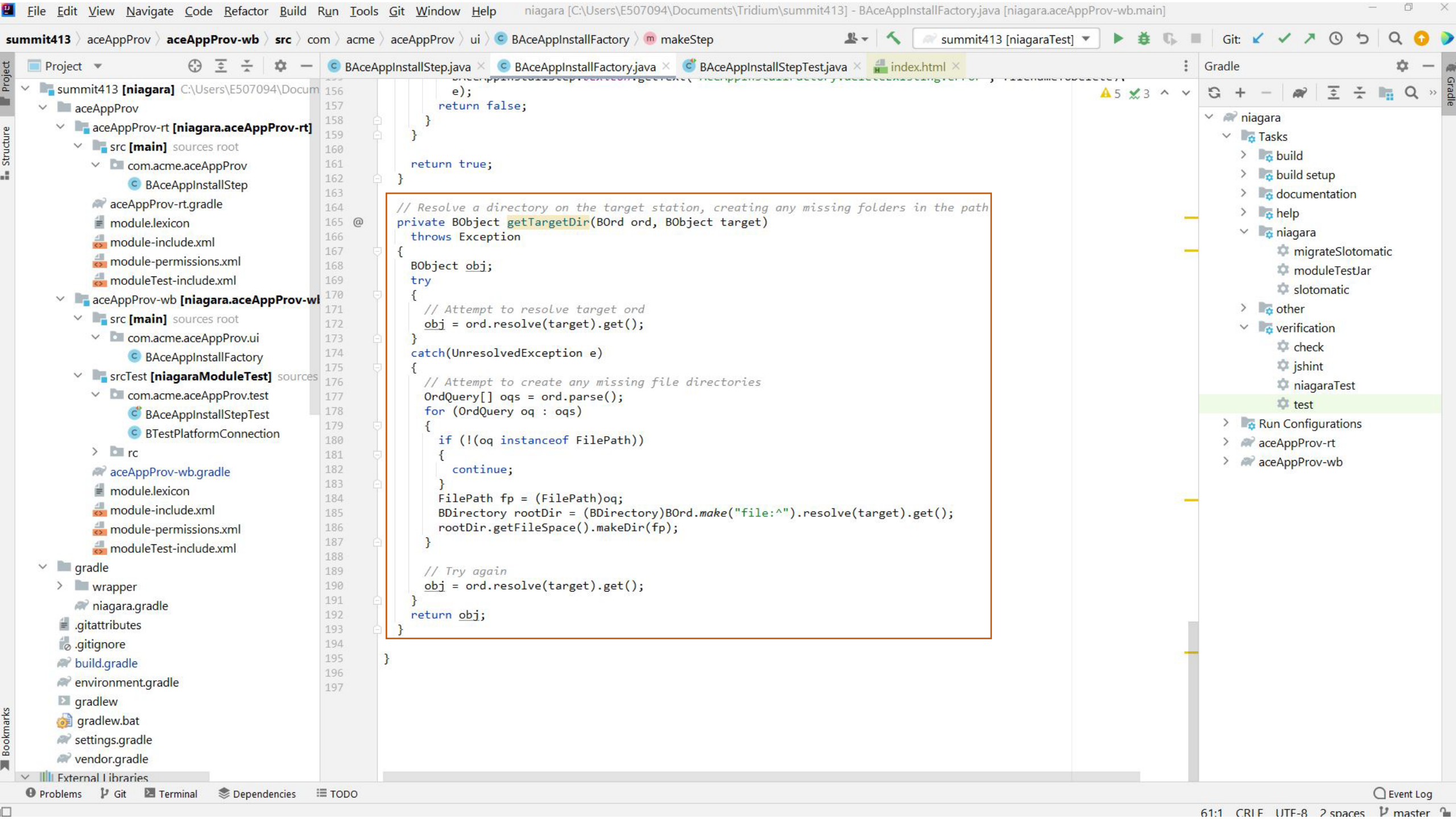
2 spaces
master


File Edit View Navigate Code Refactor Build Run Tools Git Window Help
niagara [C:\Users\E507094\Documents\Tridium\summit413] - BAceAppInstallFactory.java [niagara.aceAppProv-wb.main]
summit413 〉 aceAppProv 〉 aceAppProv-wb 〉 src 〉 com 〉 acme 〉 aceAppProv 〉 ui 〉 BAceAppInstallFactory 〉 makeStep
summit413 [niagaraTest]
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aceAppProv
aceAppProv-rt [niagara.aceAppProv-rt]
src [main] sources root
com.acme.aceAppProv
BAceAppInstallStep
aceAppProv-rt.gradle
module.lexicon
module-include.xml
module-permissions.xml
moduleTest-include.xml
aceAppProv-wb [niagara.aceAppProv-wb]
src [main] sources root
com.acme.aceAppProv.ui
BAceAppInstallFactory
srcTest [niagaraModuleTest] sources
com.acme.aceAppProv.test
BAceAppInstallStepTest
BTestPlatformConnection
rc
aceAppProv-wb.gradle
module.lexicon
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module-permissions.xml
moduleTest-include.xml
gradle
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environment.gradle
gradlew
gradlew.bat
settings.gradle
vendor.gradle
External Libraries
BAceAppInstallStep.java
BAceAppInstallFactory.java
BAceAppInstallStepTest.java
index.html
e);
return false;
}
}
return true;
}
// Resolve a directory on the target station, creating any missing folders in the path
private BObject getTargetDir(BOrd ord, BObject target)
throws Exception
{
BObject obj;
try
{
// Attempt to resolve target ord
obj = ord.resolve(target).get();
}
catch(UnresolvedException e)
{
// Attempt to create any missing file directories
OrdQuery[] oqs = ord.parse();
for (OrdQuery oq : oqs)
{
if (!(oq instanceof FilePath))
{
continue;
}
FilePath fp = (FilePath)oq;
BDirectory rootDir = (BDirectory)BOrd.make("file:^").resolve(target).get();
rootDir.getFileSpace().makeDir(fp);
}
// Try again
obj = ord.resolve(target).get();
}
return obj;
}
}
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Event Log
61:1
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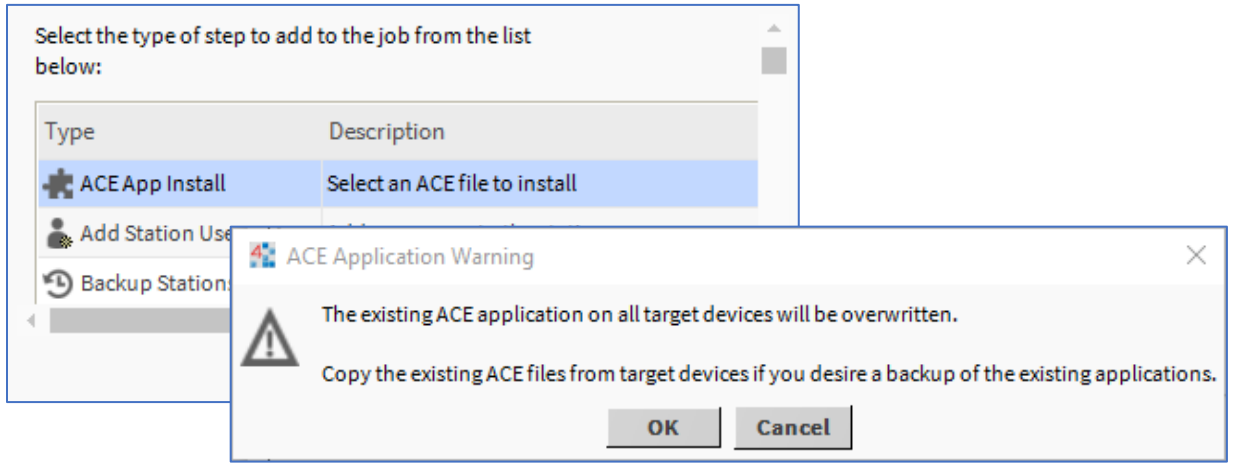
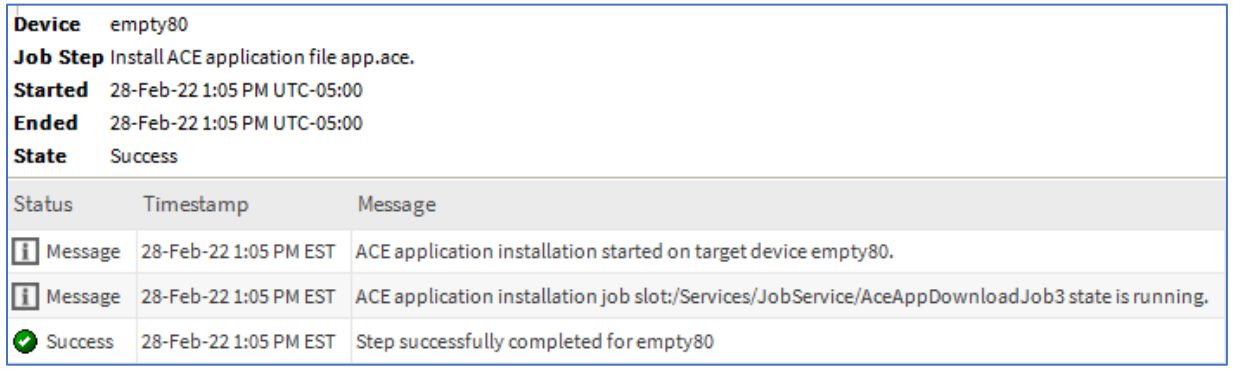
UTF-8
2 spaces
master

Lexicon and Logging

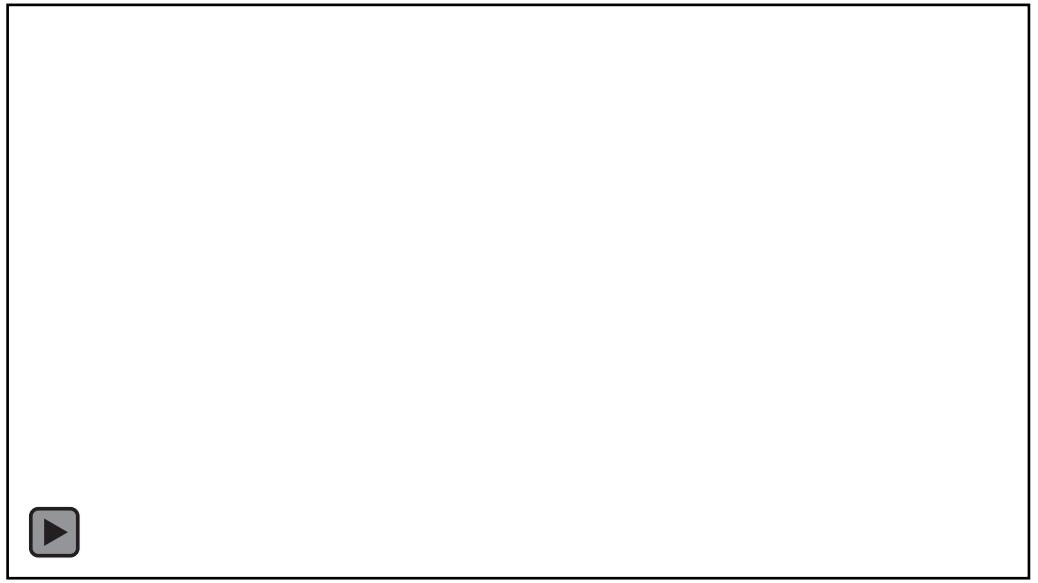
- Display information during setup
- Batch job execution messages
- Parameterized lexicon entries





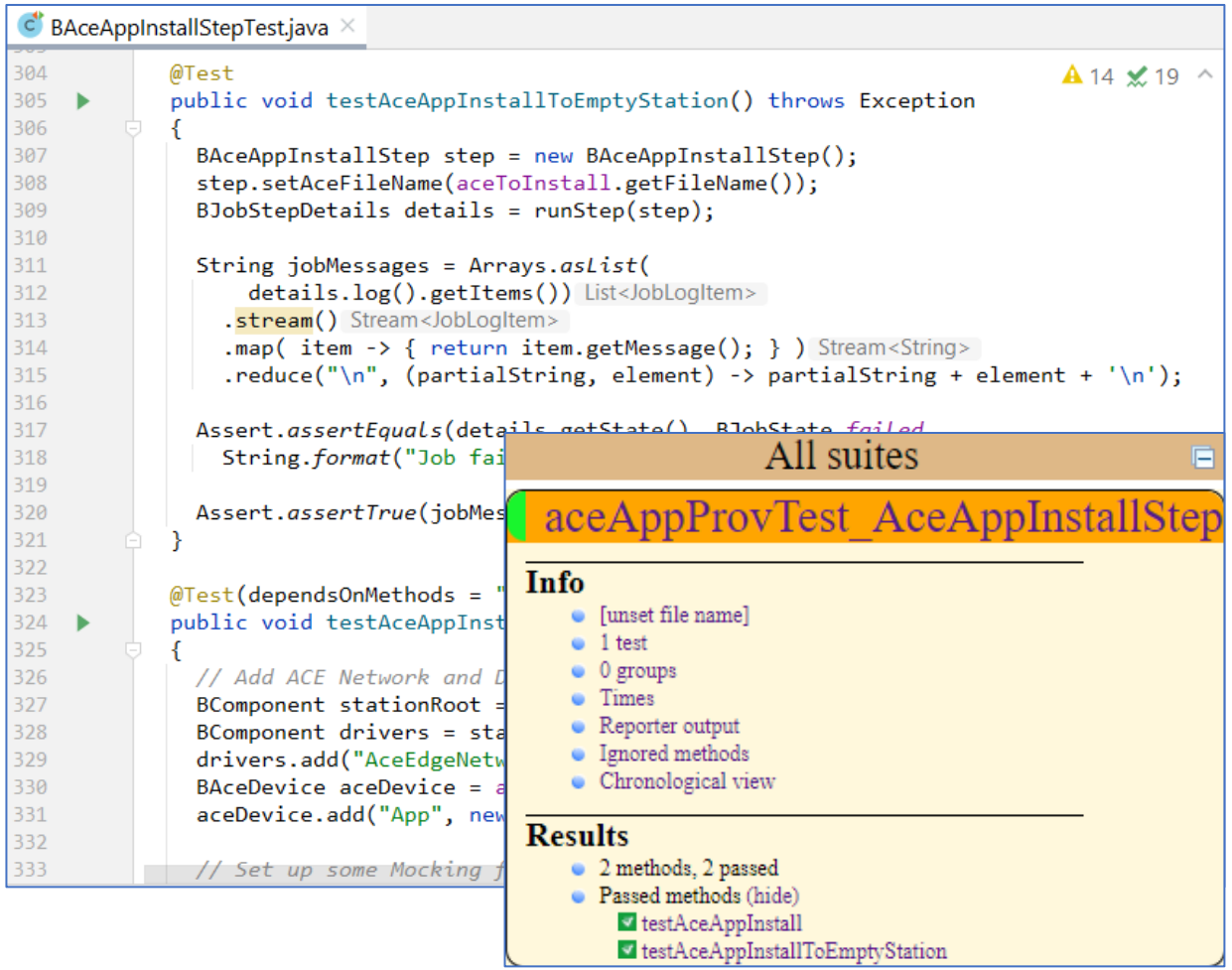
Compile and Run

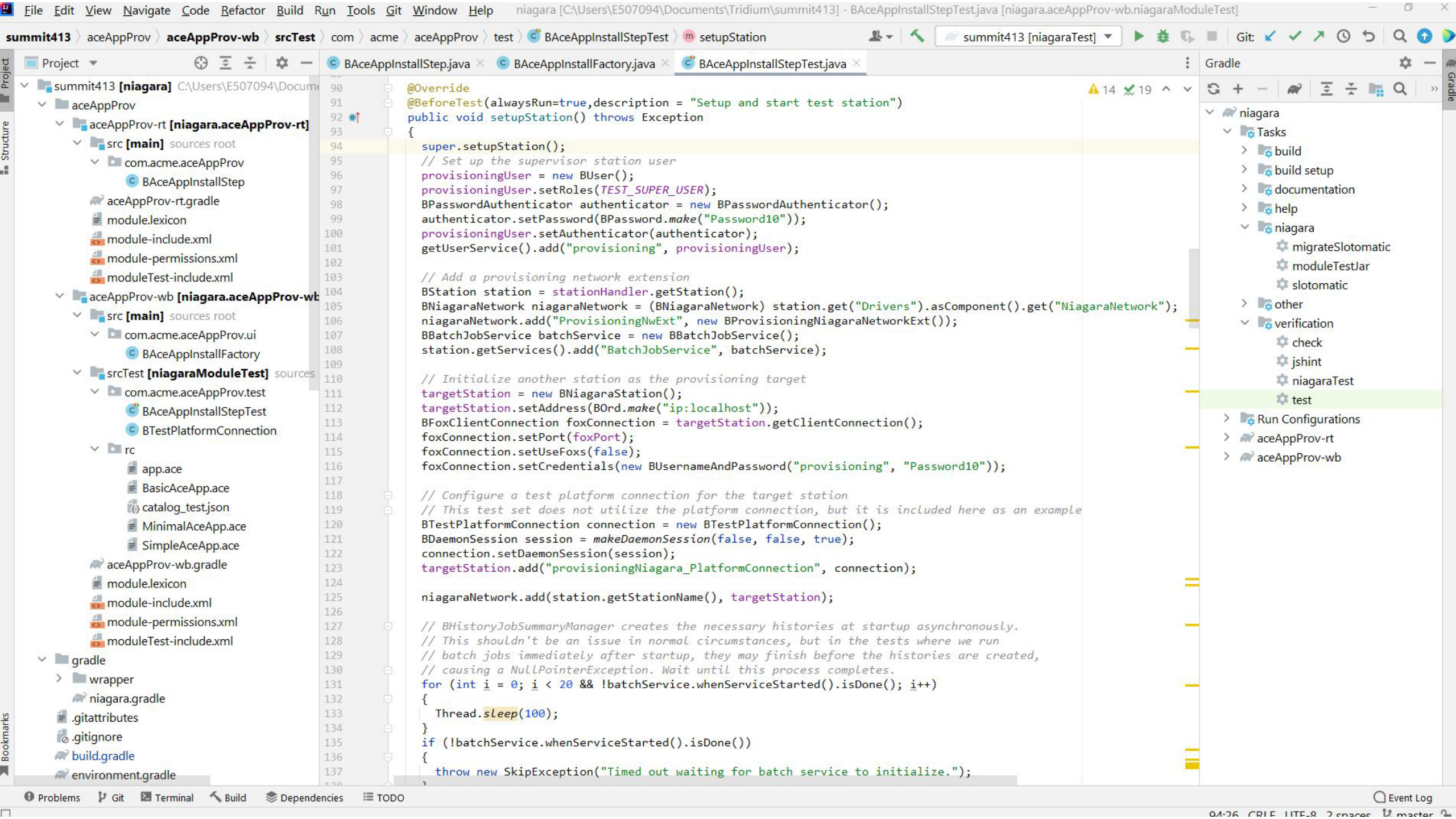
- Add missing dependencies
- Compile jar files
  - Signing not covered here
- Configure and run the job
- View job results
  - Log files
  - History records



Test Methods

- Add classes to WB part
  - setupStation()
  - beforeMethod()
  - runStep(BDeviceJobStep)
  - makeDaemonSession(...)
- Attach test artifacts
- Mockito
- test aceAppProv




File Edit View Navigate Code Refactor Build Run Tools Git Window Help
niagara [C:\Users\E507094\Documents\Tridium\summit413] - BAceAppInstallStepTest.java [niagara.aceAppProv-wb.niagaraModuleTest]
summit413 aceAppProv aceAppProv-wb srcTest com acme aceAppProv test BAceAppInstallStepTest setupStation
summit413 [niagaraTest]
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summit413 [niagara] C:\Users\E507094\Docume
aceAppProv
aceAppProv-rt [niagara.aceAppProv-rt]
src [main] sources root
com.acme.aceAppProv
BAceAppInstallStep
aceAppProv-rt.gradle
module.lexicon
module-include.xml
module-permissions.xml
moduleTest-include.xml
aceAppProv-wb [niagara.aceAppProv-wb
src [main] sources root
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BAceAppInstallStep.java
BAceAppInstallFactory.java
BAceAppInstallStepTest.java
14 19
90 @Override
91 @BeforeTest(alwaysRun=true,description = "Setup and start test station")
92 public void setupStation() throws Exception
93 {
94 super.setupStation();
95 // Set up the supervisor station user
96 provisioningUser = new BUser();
97 provisioningUser.setRoles(TEST_SUPER_USER);
98 BPasswordAuthenticator authenticator = new BPasswordAuthenticator();
99 authenticator.setPassword(BPassword.make("Password10"));
100 provisioningUser.setAuthenticator(authenticator);
101 getUserService().add("provisioning", provisioningUser);
102
103 // Add a provisioning network extension
104 BStation station = stationHandler.getStation();
105 BNiagaraNetwork niagaraNetwork = (BNiagaraNetwork) station.get("Drivers").asComponent().get("NiagaraNetwork");
106 niagaraNetwork.add("ProvisioningNwExt", new BProvisioningNiagaraNetworkExt());
107 BBatchJobService batchService = new BBatchJobService();
108 station.getServices().add("BatchJobService", batchService);
109
110 // Initialize another station as the provisioning target
111 targetStation = new BNiagaraStation();
112 targetStation.setAddress(BOrd.make("ip:localhost"));
113 BFoxClientConnection foxConnection = targetStation.getClientConnection();
114 foxConnection.setPort(foxPort);
115 foxConnection.setUseFoxs(false);
116 foxConnection.setCredentials(new BUsernameAndPassword("provisioning", "Password10"));
117
118 // Configure a test platform connection for the target station
119 // This test set does not utilize the platform connection, but it is included here as an example
120 BTestPlatformConnection connection = new BTestPlatformConnection();
121 BDaemonSession session = makeDaemonSession(false, false, true);
122 connection.setDaemonSession(session);
123 targetStation.add("provisioningNiagara_PlatformConnection", connection);
124
125 niagaraNetwork.add(station.getStationName(), targetStation);
126
127 // BHistoryJobSummaryManager creates the necessary histories at startup asynchronously.
128 // This shouldn't be an issue in normal circumstances, but in the tests where we run
129 // batch jobs immediately after startup, they may finish before the histories are created,
130 // causing a NullPointerException. Wait until this process completes.
131 for (int i = 0; i < 20 && !batchService.whenServiceStarted().isDone(); i++)
132 {
133 Thread.sleep(100);
134 }
135 if (!batchService.whenServiceStarted().isDone())
136 {
137 throw new SkipException("Timed out waiting for batch service to initialize.");
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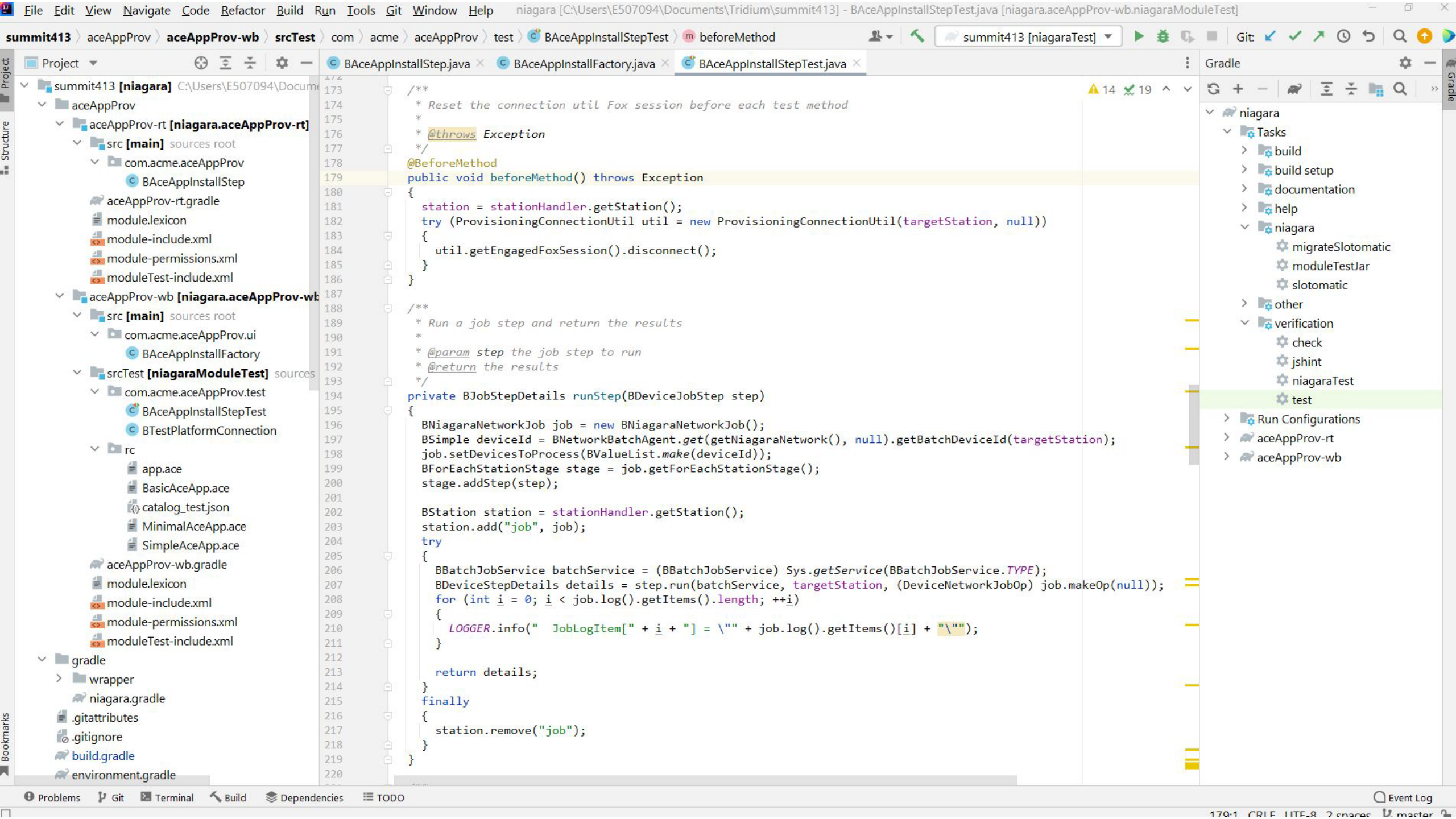
File Edit View Navigate Code Refactor Build Run Tools Git Window Help
niagara [C:\Users\E507094\Documents\Tridium\summit413] - BAceAppInstallStepTest.java [niagara.aceAppProv-wb.niagaraModuleTest]
summit413 aceAppProv aceAppProv-wb srcTest com acme aceAppProv test BAceAppInstallStepTest beforeMethod
summit413 [niagaraTest]
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aceAppProv
aceAppProv-rt [niagara.aceAppProv-rt]
src [main] sources root
com.acme.aceAppProv
BAceAppInstallStep
aceAppProv-rt.gradle
module.lexicon
module-include.xml
module-permissions.xml
moduleTest-include.xml
aceAppProv-wb [niagara.aceAppProv-wb
src [main] sources root
com.acme.aceAppProv.ui
BAceAppInstallFactory
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com.acme.aceAppProv.test
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catalog_test.json
MinimalAceApp.ace
SimpleAceApp.ace
aceAppProv-wb.gradle
module.lexicon
module-include.xml
module-permissions.xml
moduleTest-include.xml
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niagara.gradle
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build.gradle
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BAceAppInstallFactory.java
BAceAppInstallStepTest.java
14 19
/**
* Reset the connection util Fox session before each test method
*
* @throws Exception
*/
@BeforeMethod
public void beforeMethod() throws Exception
{
station = stationHandler.getStation();
try (ProvisioningConnectionUtil util = new ProvisioningConnectionUtil(targetStation, null))
{
util.getEngagedFoxSession().disconnect();
}
}
/**
* Run a job step and return the results
*
* @param step the job step to run
* @return the results
*/
private BJobStepDetails runStep(BDeviceJobStep step)
{
BNiagaraNetworkJob job = new BNiagaraNetworkJob();
BSimple deviceId = BNetworkBatchAgent.get(getNiagaraNetwork(), null).getBatchDeviceId(targetStation);
job.setDevicesToProcess(BValueList.make(deviceId));
BForEachStationStage stage = job.getForEachStationStage();
stage.addStep(step);
BStation station = stationHandler.getStation();
station.add("job", job);
try
{
BBatchJobService batchService = (BBatchJobService) Sys.getService(BBatchJobService.TYPE);
BDeviceStepDetails details = step.run(batchService, targetStation, (DeviceNetworkJobOp) job.makeOp(null));
for (int i = 0; i < job.log().getItems().length; ++i)
{
LOGGER.info(" JobLogItem[" + i + "] = \"" + job.log().getItems()[i] + "\"");
}
return details;
}
finally
{
station.remove("job");
}
}
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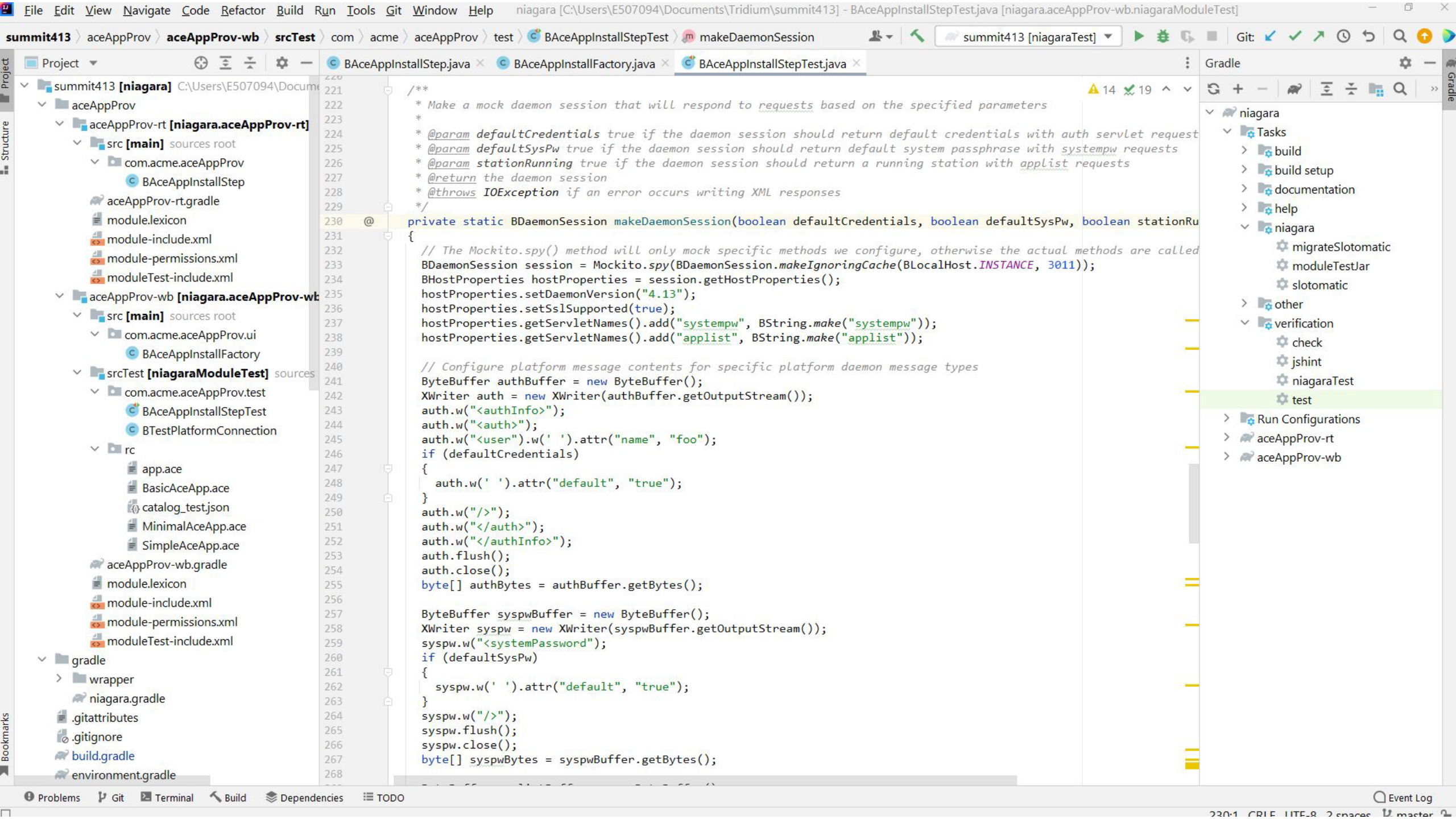
File Edit View Navigate Code Refactor Build Run Tools Git Window Help
niagara [C:\Users\E507094\Documents\Tridium\summit413] - BAceAppInstallStepTest.java [niagara.aceAppProv-wb.niagaraModuleTest]
summit413 〉 aceAppProv 〉 aceAppProv-wb 〉 srcTest 〉 com 〉 acme 〉 aceAppProv 〉 test 〉 BAceAppInstallStepTest 〉 makeDaemonSession
summit413 [niagaraTest]
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aceAppProv
aceAppProv-rt [niagara.aceAppProv-rt]
src [main] sources root
com.acme.aceAppProv
BAceAppInstallStep
aceAppProv-rt.gradle
module.lexicon
module-include.xml
module-permissions.xml
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aceAppProv-wb [niagara.aceAppProv-wb
src [main] sources root
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catalog_test.json
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SimpleAceApp.ace
aceAppProv-wb.gradle
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module-permissions.xml
moduleTest-include.xml
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BAceAppInstallFactory.java
BAceAppInstallStepTest.java
14 19
/**
* Make a mock daemon session that will respond to requests based on the specified parameters
*
* @param defaultCredentials true if the daemon session should return default credentials with auth servlet request
* @param defaultSysPw true if the daemon session should return default system passphrase with systempw requests
* @param stationRunning true if the daemon session should return a running station with applist requests
* @return the daemon session
* @throws IOException if an error occurs writing XML responses
*/
private static BDaemonSession makeDaemonSession(boolean defaultCredentials, boolean defaultSysPw, boolean stationRu
{
// The Mockito.spy() method will only mock specific methods we configure, otherwise the actual methods are called
BDaemonSession session = Mockito.spy(BDaemonSession.makeIgnoringCache(BLocalHost.INSTANCE, 3011));
BHostProperties hostProperties = session.getHostProperties();
hostProperties.setDaemonVersion("4.13");
hostProperties.setSslSupported(true);
hostProperties.getServletNames().add("systempw", BString.make("systempw"));
hostProperties.getServletNames().add("applist", BString.make("applist"));
// Configure platform message contents for specific platform daemon message types
ByteBuffer authBuffer = new ByteBuffer();
XWriter auth = new XWriter(authBuffer.getOutputStream());
auth.w("<authInfo>");
auth.w("<auth>");
auth.w("<user").w(' ').attr("name", "foo");
if (defaultCredentials)
{
auth.w(' ').attr("default", "true");
}
auth.w("/>");
auth.w("</auth>");
auth.w("</authInfo>");
auth.flush();
auth.close();
byte[] authBytes = authBuffer.getBytes();
ByteBuffer syspwBuffer = new ByteBuffer();
XWriter syspw = new XWriter(syspwBuffer.getOutputStream());
syspw.w("<systemPassword");
if (defaultSysPw)
{
syspw.w(' ').attr("default", "true");
}
syspw.w("/>");
syspw.flush();
syspw.close();
byte[] syspwBytes = syspwBuffer.getBytes();
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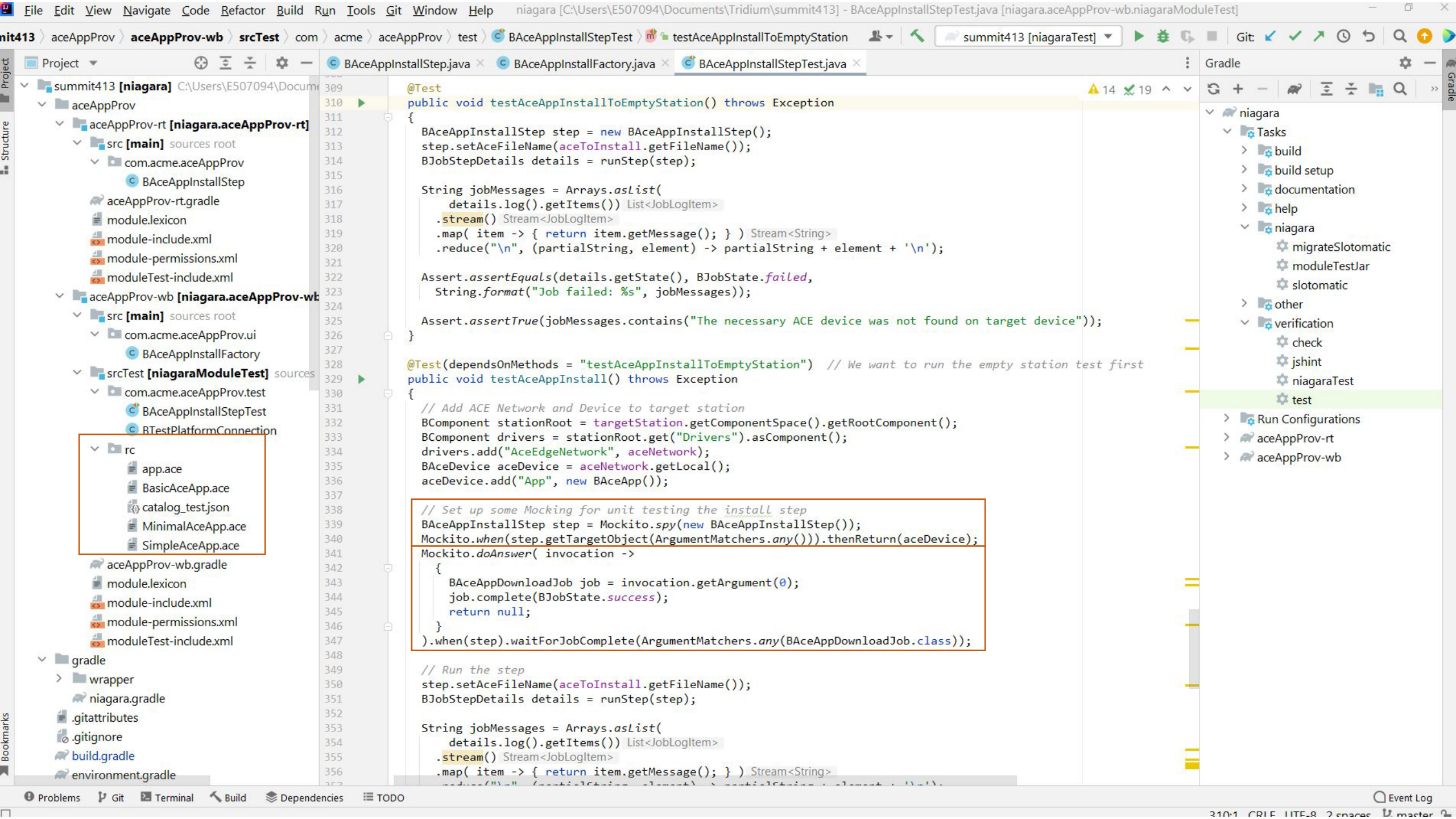
File Edit View Navigate Code Refactor Build Run Tools Git Window Help
niagara [C:\Users\E507094\Documents\Tridium\summit413] - BAceAppInstallStepTest.java [niagara.aceAppProv-wb.niagaraModuleTest]
nit413 〉 aceAppProv 〉 aceAppProv-wb 〉 srcTest 〉 com 〉 acme 〉 aceAppProv 〉 test 〉 BAceAppInstallStepTest 〉 testAceAppInstallToEmptyStation
summit413 [niagaraTest]
Git:
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summit413 [niagara] C:\Users\E507094\Docume
aceAppProv
aceAppProv-rt [niagara.aceAppProv-rt]
src [main] sources root
com.acme.aceAppProv
BAceAppInstallStep
aceAppProv-rt.gradle
module.lexicon
module-include.xml
module-permissions.xml
moduleTest-include.xml
aceAppProv-wb [niagara.aceAppProv-wb
src [main] sources root
com.acme.aceAppProv.ui
BAceAppInstallFactory
srcTest [niagaraModuleTest] sources
com.acme.aceAppProv.test
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moduleTest-include.xml
gradle
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.gitignore
build.gradle
environment.gradle
BAceAppInstallStep.java
BAceAppInstallFactory.java
BAceAppInstallStepTest.java
@Test
public void testAceAppInstallToEmptyStation() throws Exception
{
BAceAppInstallStep step = new BAceAppInstallStep();
step.setAceFileName(aceToInstall.getFileName());
BJobStepDetails details = runStep(step);
String jobMessages = Arrays.asList(
details.log().getItems()) List<JobLogItem>
.stream() Stream<JobLogItem>
.map(item -> { return item.getMessage(); }) Stream<String>
.reduce("\n", (partialString, element) -> partialString + element + '\n');
Assert.assertEquals(details.getState(), BJobState.failed,
String.format("Job failed: %s", jobMessages));
Assert.assertTrue(jobMessages.contains("The necessary ACE device was not found on target device"));
}
@Test(dependsOnMethods = "testAceAppInstallToEmptyStation") // We want to run the empty station test first
public void testAceAppInstall() throws Exception
{
// Add ACE Network and Device to target station
BComponent stationRoot = targetStation.getComponentSpace().getRootComponent();
BComponent drivers = stationRoot.get("Drivers").asComponent();
drivers.add("AceEdgeNetwork", aceNetwork);
BAceDevice aceDevice = aceNetwork.getLocal();
aceDevice.add("App", new BAceApp());
// Set up some Mocking for unit testing the install step
BAceAppInstallStep step = Mockito.spy(new BAceAppInstallStep());
Mockito.when(step.getTargetObject(ArgumentMatchers.any())).thenReturn(aceDevice);
Mockito.doAnswer(invocation ->
{
BAceAppDownloadJob job = invocation.getArgument(0);
job.complete(BJobState.success);
return null;
}
).when(step).waitForJobComplete(ArgumentMatchers.any(BAceAppDownloadJob.class));
// Run the step
step.setAceFileName(aceToInstall.getFileName());
BJobStepDetails details = runStep(step);
String jobMessages = Arrays.asList(
details.log().getItems()) List<JobLogItem>
.stream() Stream<JobLogItem>
.map(item -> { return item.getMessage(); }) Stream<String>
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Additional Considerations

- Parallel job execution
  - getParallelExecutionConflicts()
- Provision device with default credentials
  - BIPrivilegedDeviceJobStep
- Security Manager
  - ProvisioningConnectionUtil
  - module-permissions.xml

```
@Override
public Set<BDevice> getParallelExecutionConflicts(BBatchJobService svc,
  BDevice device, Set<BDevice> allDevices, DeviceNetworkJobOp op)
{
  return Collections.singleton(device);
}
```

```
@NiagaraType
public class BRenameStationStep
  extends BDeviceJobStep
  implements BIPrivilegedDeviceJobStep
{
  /*+ ------------ BEGIN BAJA AUTO GENERATED CODE ------------ +*/
```

```
<niagara-permission-groups type="station">
  <req-permission> // Required permission
    <name>KEY_STORE</name>
    <purposeKey>This module needs to check exemptions.</purposeKey>
    <parameters>
      <parameter name="keystores" value="userExemptionStore"/>
      <parameter name="actions" value="read"/>
    </parameters>
  </req-permission>
</niagara-permission-groups>
```

TRIDIUM

github.com/tridium