ARL-TR-7961 ● Feb 2017

US Army Research Laboratory

Installing and Executing Information Object Analysis, Intent, Dissemination, and Enhancement (IOAIDE) and Its Dependencies

by Laurel C Sadler and Christian D Schlesiger

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*
February 2017

2. REPORT TYPE
Technical Report

3. DATES COVERED (From - To)

4. TITLE AND SUBTITLE
Installing and Executing Information Object Analysis, Intent, Dissemination, and Enhancement (IOAIDE) and Its Dependencies

5a. CONTRACT NUMBER

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)
Laurel C Sadler and Christian D Schlesiger

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
US Army Research Laboratory
ATTN: RDRL-CII-B
2800 Powder Mill Road
Adelphi, MD 20783-1138

8. PERFORMING ORGANIZATION REPORT NUMBER
ARL-TR-7961

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Information Object Analysis, Intent, Dissemination, and Enhancement (IOAIDE) is a novel information framework developed at the US Army Research Laboratory that supports the needs of command and control analysts as well as researchers in both algorithm and tool prototyping. It supports dynamic plugin of analysis modules, for either research or analysis tasks. The framework integrates multiple image processing algorithms, image and video feeds, and a dissemination service for the dissemination and retrieval of information objects, as well as a central database for storage and query of information objects. With the variety of services and development tools required to develop and run the IOAIDE tool, it is rather complicated to deploy the application or set up its development environment. This report is targeted at developers and users with the basic knowledge and understanding of Windows-based computer operations. The report lists the required commercial software packages and describes in intricate detail the steps involved in preparing the IOAIDE application computer for development, execution, and database setup.

15. SUBJECT TERMS
software, installation, applications, integration, instructions

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON** Laurel C Sadler
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. TELEPHONE NUMBER (Include area code)**
Unclassified	Unclassified	Unclassified	UU	38	301-394-1221

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1. Introduction

Information Object Analysis, Intent, Dissemination, and Enhancement (IOAIDE) is a novel information framework developed at the US Army Research Laboratory (ARL) that supports the needs of command and control analysts as well as researchers in both algorithm and tool prototyping. It supports dynamic plugin of analysis modules, for either research or analysis tasks. The framework integrates multiple image processing algorithms, image and video feeds, and a dissemination service for the dissemination and retrieval of information objects, as well as a central database for storage and query of information objects. IOAIDE provides an environment to run experiments with analysts, human-in-the-loop, to evaluate the ability to enhance the capability of the analyst, reduce the workload of the analyst, and provide visual organization of data based on the value of information (VoI) of the data for the analyst.[1] Future research using the IOAIDE environment will include experiments to evaluate the effectiveness of allowing the analyst to modify the VoI of an information object and then disseminate as a new message with higher VoI or re-disseminate the same message with increased VoI.

Several of the image processing algorithms are made into client applications that can be accessed from an image processing web service[2] developed following Representational State Transfer (REST) standards by a mobile app, laptop PC, and other devices. Similarly, weather tweets can be accessed via the Weather Digest Web Service, which collects and extracts essential weather information from the National Weather Service and sends the digested information to Twitter. These data can be viewed by the analyst or used by other algorithms that may have been integrated into IOAIDE. Other more central processing unit (CPU)-intensive and time-constrained algorithms are installed directly on the laptop PC or Microsoft Surface Pro.

IOAIDE supports both dissemination and retrieval of information objects through 2 third-party software packages: *Dissemination Service (DisService)*[3] and *Proactive Dissemination Service (DSPro)*[4]. DisService is a peer-to-peer, publish-subscribe, store-carry-and-forward middleware designed to support efficient information dissemination and group communication in resource-constrained networks. DSPro extends the functionality of DisService by supporting proactive transmission of information, which realizes mission-context, VoI-based filtering, hence, limiting the amount of data the analyst receives, which is the first step in reducing analyst workload.

With the variety of services and development tools required to develop and run the IOAIDE tool, it is rather complicated to deploy the application or set up its development environment. This report is targeted at developers and users with the basic knowledge and understanding of Windows-based computer operations. The report lists the required commercial software packages and describes in intricate detail the steps involved in preparing the IOAIDE application computer for development, execution, and database setup.

2. Computer and Software Development Tools Requirements

The user interface and system control software web services were developed in .NET Framework 4.5.2 with Windows Presentation Foundation using Microsoft Visual Studio 2015 (version 14.0). The dissemination service was developed in C++ using Microsoft Visual Studio 2015. The database was designed and is maintained with Microsoft SQL Server Management Server. Basic requirements for the IOAIDE computing environment prior to executing the instructions in this report include a Microsoft Windows device running Windows 10 with Visual Studio 2015 and Microsoft SQL Server 2016 installed.

It is also assumed that the system upon which IOAIDE is to be installed is connected to the Research Development and Engineering Network so as to have access to various resources stored in network storage. One of these resources is an Apache Subversion (SVN) software repository from which most of the software is checked out. Therefore, a SVN client is required: it is assumed that TortoiseSVN has been installed on the target computer system. Certain resources have been archived with the 7-Zip utility application, which are then required to access these archives on the target computer.

3. Installing the Software for IOAIDE

This section describes each step necessary to add or install software and copy necessary video data to the computer to build a basic demonstration/development environment for IOAIDE:

3.1 Load ARL Software

The following are the steps for loading the ARL software:

1) Check out the Components and commercial off-the-shelf (COTS) directories from https://batinfo.ciib-idvrn.arl:8443/svn/ARLProducts/trunk/Components and https://batiopnfo.ciib-idvrn.arl:8443/svn/cots/trunk/COTS to C:\ARLDeveloper\Components and C:\ARLDeveloper\COTS, respectively. If setting up the computer for Open Standard for Unattended Sensors plugins, check out https://batinfo.ciib-idvrn.arl:8443/svn/ARLProducts/trunk/ Java to

C:\ARLDeveloper\Java, as well. It may be necessary to use the direct IP address 172.18.128.22 in place of batinfo.ciib-idvrn.arl in the previous addresses to reach the repository.

2) To check out from SVN, do the following:

   a) Right click the mouse on the desktop and select SVN Checkout… (Fig. 1). The checkout menu's popup window appears on the screen.

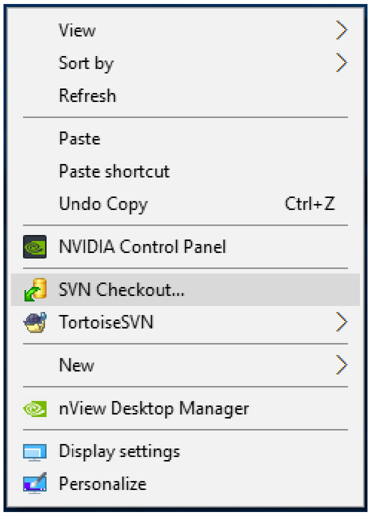


Fig. 1 SVN Checkout...

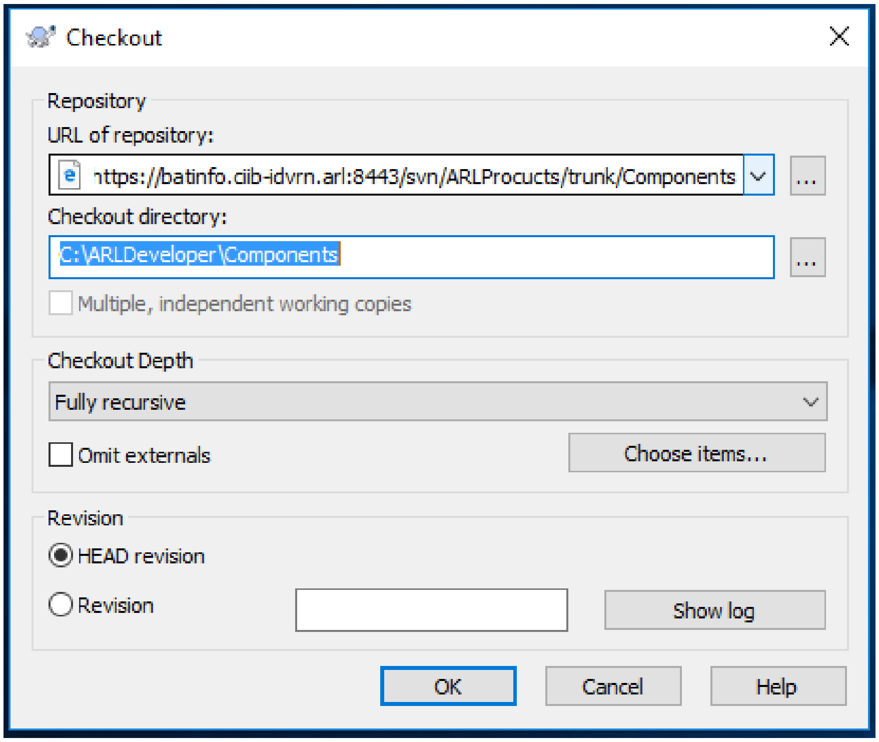
   b) In the first textbox (Fig. 2), type

   https://batinfo.ciib-idvrn.arl:8443/svn/ARLProducts/trunk/Components

   c) In the second textbox (Fig. 2), type

   C:\ARLDeveloper\Components

   d) Click OK (Fig. 2).



Checkout

Repository

URL of repository: https://batinfo.ciib-idvrn.arl:8443/svn/ARLProcucts/trunk/Components

Checkout directory: C:\ARLDeveloper\Components

□ Multiple, independent working copies

Checkout Depth

Fully recursive

□ Omit externals

Revision

● HEAD revision

○ Revision

Fig. 2 SVN Checkout textbox

e) Repeat these steps to check out the additional items listed previously.

3.2 Load ARL Applications

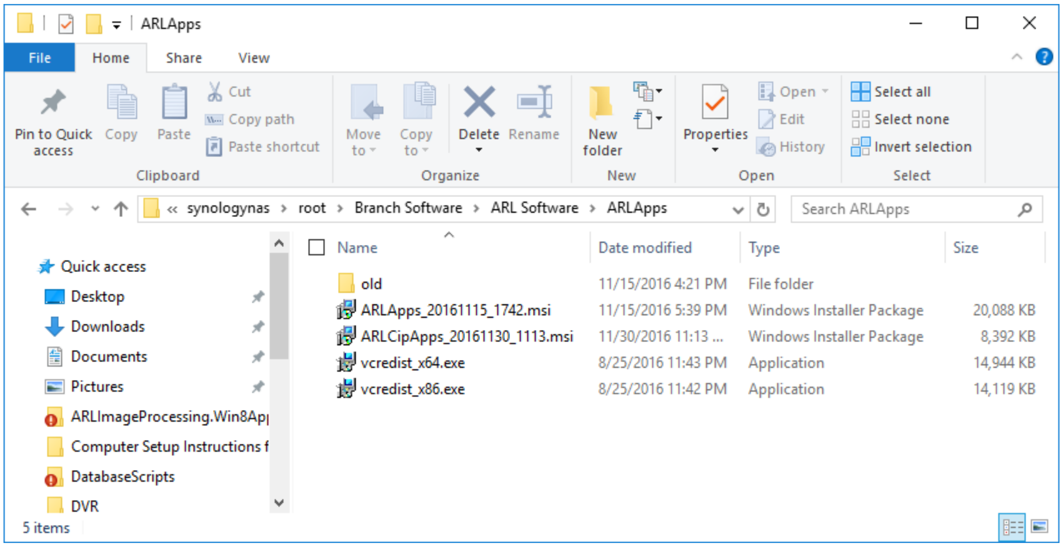
The following are the steps for loading the ARL applications:

1) If the Start network GO and Stop network STOP icons are not visible on the desktop, it is necessary to install the ARLApps application. To install ARLApps, perform the following steps:

a) Right click the Windows icon ⊞ and left click File Explorer. The File Explorer popup window appears on the screen (Fig. 3). In the textbox at the top of the File Explorer, type (including all spaces)

\\Synologynas\Root\Branch Software\ARL Software\ARLApps

b) Double click ARLApps_20161115_1742.msi (Fig. 3).

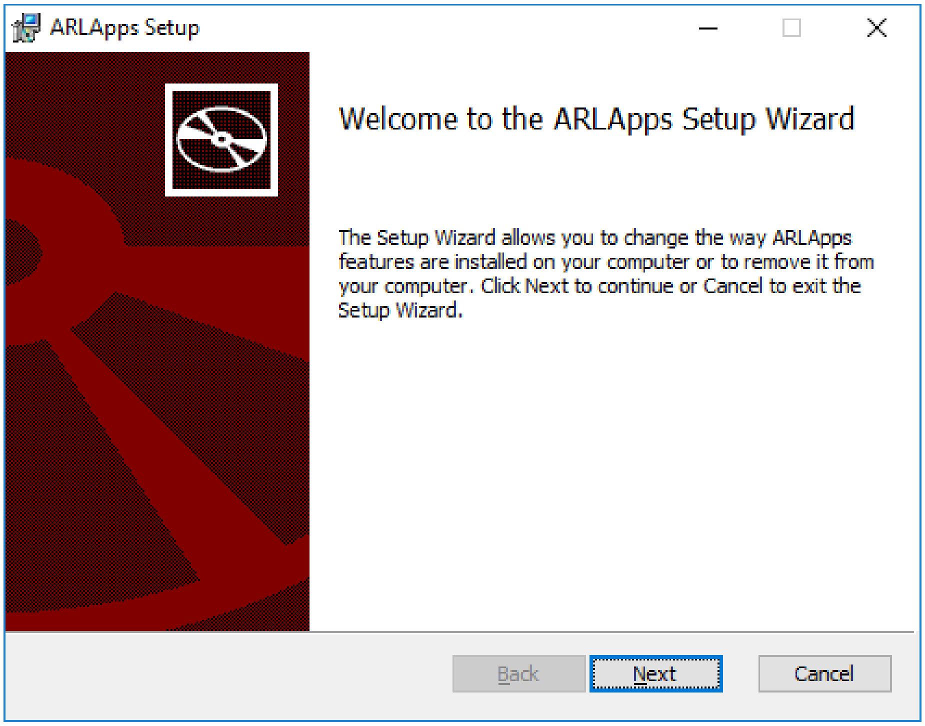


« synologynas › root › Branch Software › ARL Software › ARLApps

Name	Date modified	Type	Size
old	11/15/2016 4:21 PM	File folder	
ARLApps_20161115_1742.msi	11/15/2016 5:39 PM	Windows Installer Package	20,088 KB
ARLCipApps_20161130_1113.msi	11/30/2016 11:13 ...	Windows Installer Package	8,392 KB
vcredist_x64.exe	8/25/2016 11:43 PM	Application	14,944 KB
vcredist_x86.exe	8/25/2016 11:42 PM	Application	14,119 KB

Fig. 3 Install ARLApps

c) The ARLApps Setup Wizard appears on the screen (Fig. 4).



Welcome to the ARLApps Setup Wizard

The Setup Wizard allows you to change the way ARLApps features are installed on your computer or to remove it from your computer. Click Next to continue or Cancel to exit the Setup Wizard.

Fig. 4 ARLApps Setup Wizard

d) Click Next.

e) Check the ☑ I accept the terms in the License Agreement check box and click Next.

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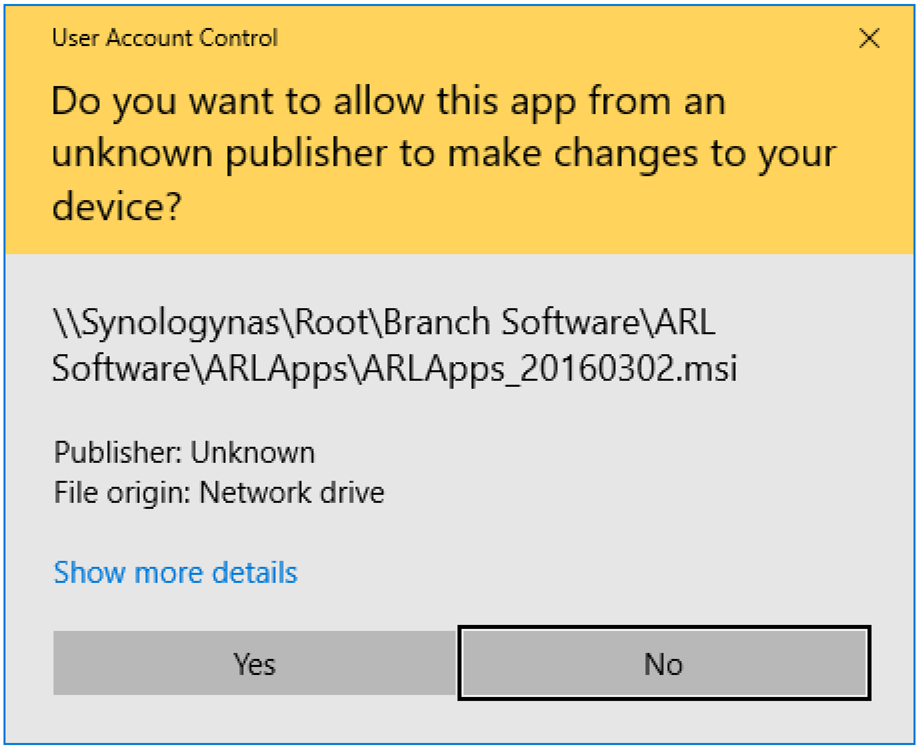
f) The Custom Setup window appears. Click Next.

g) The ready to install ARLApps window appears. Click Install.

h) The User Account Control Window appears on the screen (Fig. 5).



User Account Control

Do you want to allow this app from an unknown publisher to make changes to your device?

\\Synologynas\Root\Branch Software\ARL Software\ARLApps\ARLApps_20160302.msi

Publisher: Unknown
File origin: Network drive

Show more details

Fig. 5 User Account Control (new app)

i) Click Yes.

j) Click Finish.

k) If using Legacy DVR software, also load ARLCipApps by double clicking ARLCipApps_20161130_1113.msi (see Fig. 3).

l) The ARLCipApps Setup Wizard appears on the screen. It is similar to the ARLApps Wizard shown in Fig. 4.

m) Follow steps 2e through 2k to install the applications.

3.3 Load the DSPro Software

The following are the steps for loading the DSPro software:

1) Copy Nomads.7z from the \\Synologynas\Root\Public\IOAIDE setup to the desktop:

   a) Right click the Windows icon ⊞ and select File Explorer. The File Explorer popup window appears on the screen.

   b) In the File Explorer textbox at the top, type (including the spaces)

      \\Synologynas\Root\Public\IOAIDE setup

   c) Drag Nomads.7z to the desktop. Unzip the files to the desktop. Right click on Nomads.7z folder and click 7-Zip->Extract Here (Fig. 6).

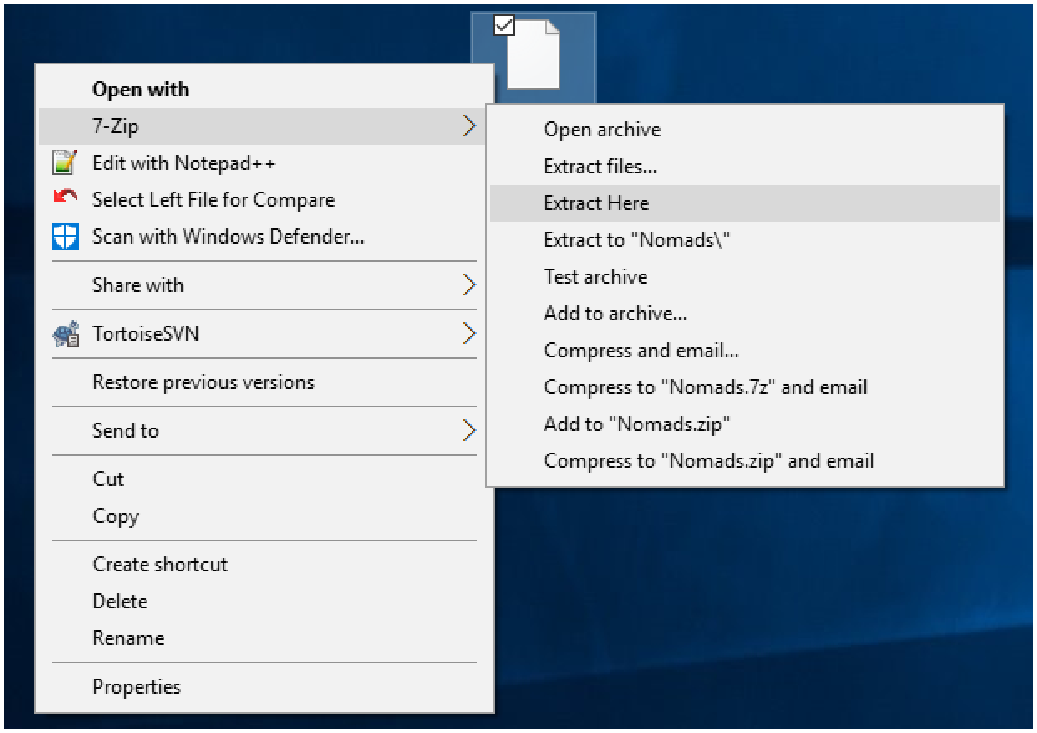


Fig. 6 Unzip files

   d) When the unzip process is complete, move the unzipped Nomads folder to C:

      i) Right click the Windows icon ⊞ and select File Explorer. The File Explorer popup window appears on the screen (Fig. 7).

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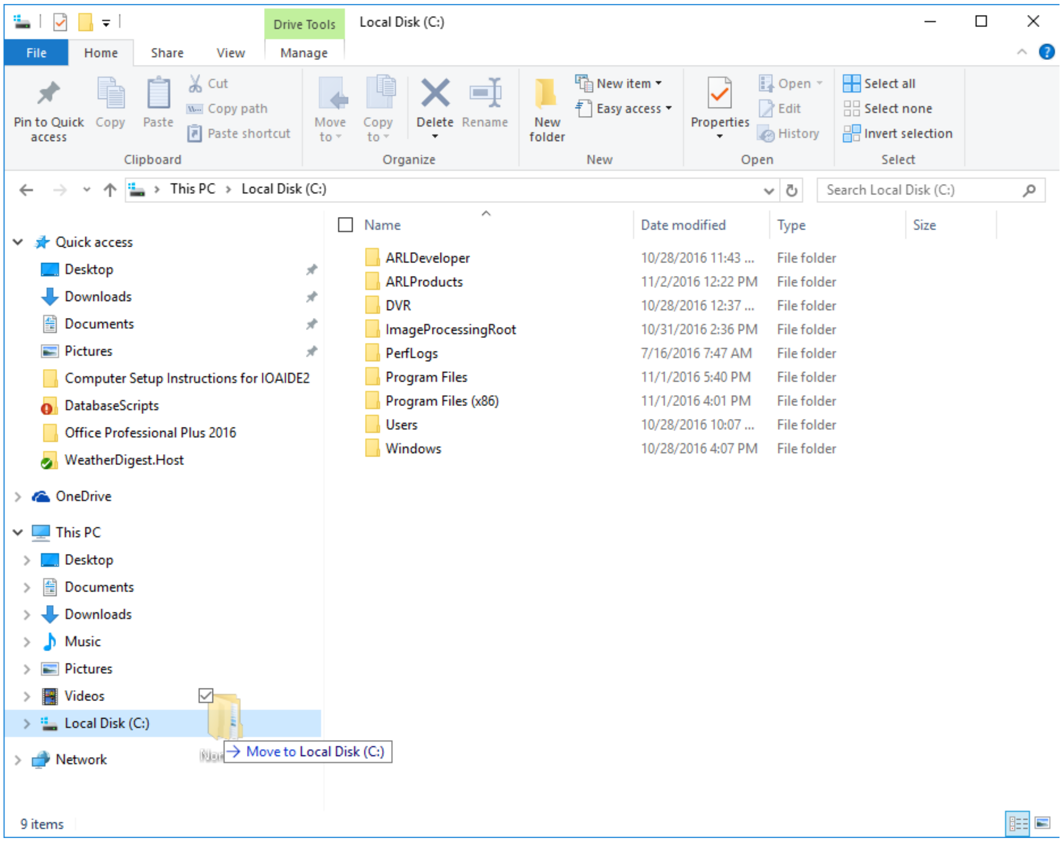
ii) Drag the Nomads folder over › Local Disk (C:) and release as shown in Fig. 7. The folder has now been moved to the C drive.



Name	Date modified	Type	Size
ARLDeveloper	10/28/2016 11:43 ...	File folder	
ARLProducts	11/2/2016 12:22 PM	File folder	
DVR	10/28/2016 12:37 ...	File folder	
ImageProcessingRoot	10/31/2016 2:36 PM	File folder	
PerfLogs	7/16/2016 7:47 AM	File folder	
Program Files	11/1/2016 5:40 PM	File folder	
Program Files (x86)	11/1/2016 4:01 PM	File folder	
Users	10/28/2016 10:07 ...	File folder	
Windows	10/28/2016 4:07 PM	File folder	

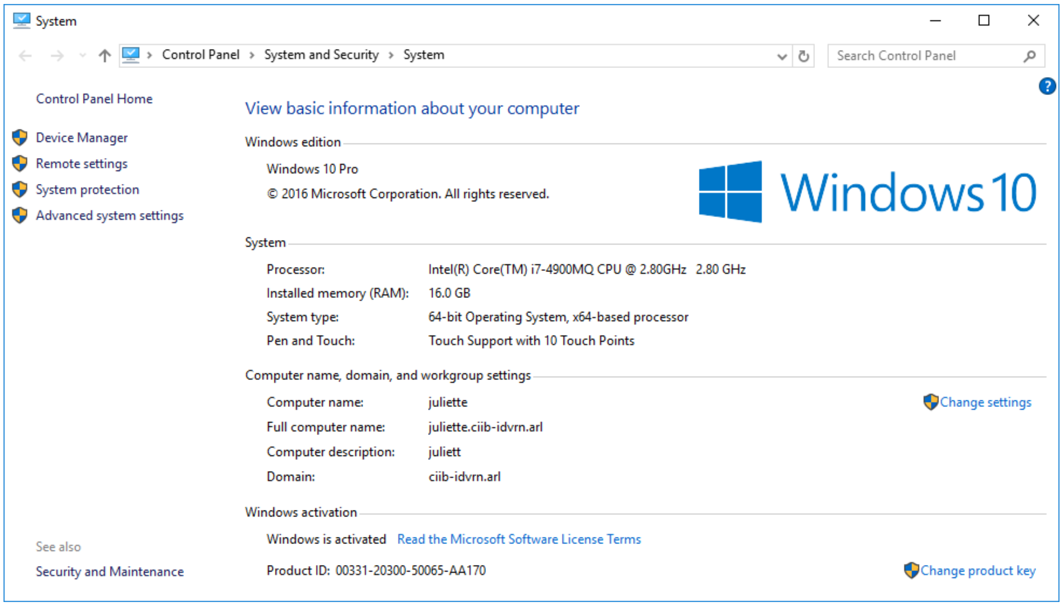
Fig. 7 Move Nomads to C:

2) Edit the DSPro config file to reflect the computer name:

a) Click the Windows icon ⊞ and select File Explorer on the right. The File Explorer popup window appears on the screen (see Fig. 7).

b) Right click › This PC, select Properties. The system popup window appears on the screen (Fig. 8).

c) Find the computer name. In this example, the computer name is “juliette”.



View basic information about your computer

Windows edition

Windows 10 Pro

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System

Processor:	Intel(R) Core(TM) i7-4900MQ CPU @ 2.80GHz 2.80 GHz
Installed memory (RAM):	16.0 GB
System type:	64-bit Operating System, x64-based processor
Pen and Touch:	Touch Support with 10 Touch Points

Computer name, domain, and workgroup settings

Computer name:	juliette
Full computer name:	juliette.ciib-idvrn.arl
Computer description:	juliett
Domain:	ciib-idvrn.arl

Windows activation

Windows is activated

Product ID: 00331-20300-50065-AA170

Fig. 8 System popup window

d) Using the File Explorer as in step 2a, navigate to C:\ARLDeveloper\Components\ihmc\nomads\aci\conf by typing the previous string into the textbox at the top of the File Explorer.

e) Open onrdemo-sen.properties with Notepad (double click onrdemo-sen.properties and it opens on the desktop). If this does not open, right select Notepad or More apps in the How do you open this file? popup window. If selecting More apps, choose Notepad from the list of choices.

f) Change first line aci.disService.nodeUUID=juliette to aci.disService.nodeUUID='computer name' where "computer name" is the name found in step 2c (i.e., juliette). This computer name is also used in step 9h.

g) Save file right click File and select Save. Then exit NotePad by clicking the ✕ in the upper-right corner of the window.

3) Build the DSPro software package:

a) Using the File Explorer as in step 2a, navigate to C:\Nomads\aci\cpp\dspro2\win32.

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b) Double click dsro2.sln or dspro2 with type defined as Microsoft Visual Studio Solution. This opens the DSPro solution in Microsoft Visual Studio (Fig. 9).

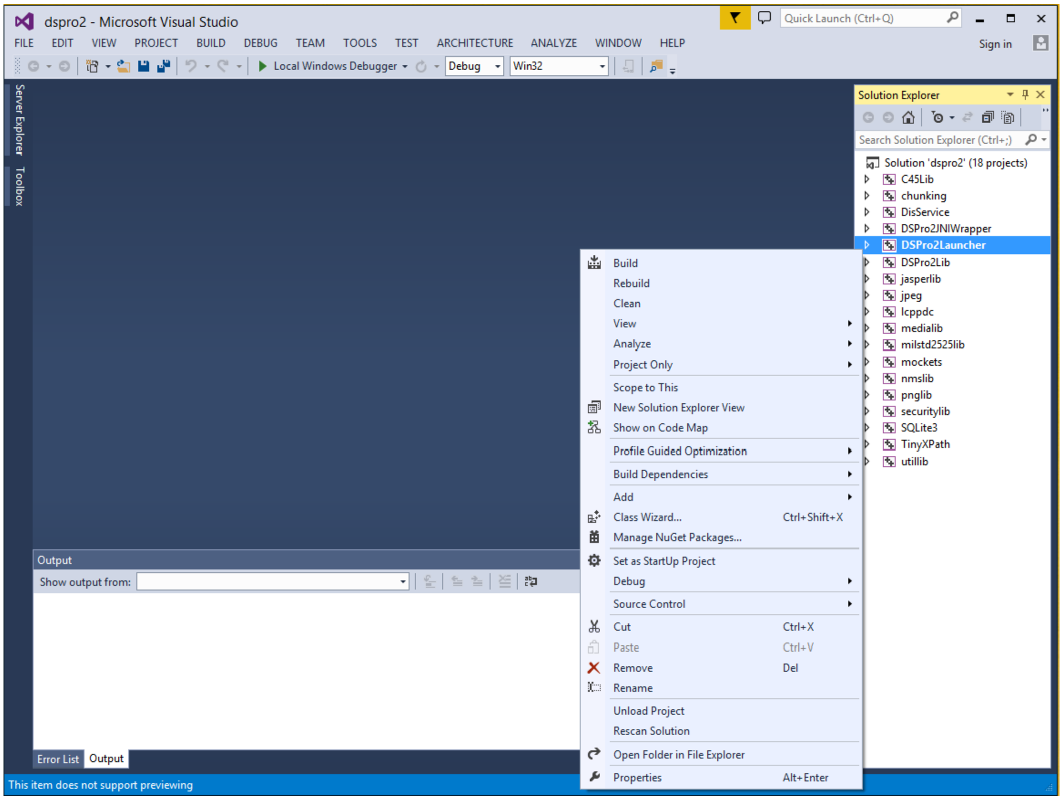


Fig. 9 Visual Studio DSPro project

c) Make sure dsPro2Launcher is set as the startup program. If **dsPro2Launcher** is in bold letters in the Solution Explorer window, it is set as the startup program. If this is not the case, right click dsPro2Launcher and select “Set as Startup Project”.

d) Right click dsPro2Launcher and select Build to build the project.

e) The Output window should display Build: 18 succeeded, 0 failed, 0 up-to-date, 0 skipped.

f) Exit Visual Studio by clicking the ✕ in the upper-right corner.

4) Set up to use Bing Maps:

a) Copy Bing Maps WPF Control from the \\Synologynas\root\public\IOAIDE setup to C:\ProgramFiles(x86).

b) Using the File Explorer as in step 2a, navigate to \\Synologynas\root\public\IOAIDE setup.

c) Using a separate File Explorer as in step 2a, navigate to C:\ProgramFiles(x86).

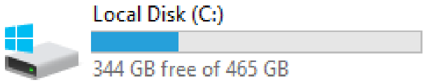
d) Drag Bing Maps WPF Control from \\Synologynas\root\public\IOAIDE setup to C:\ProgramFiles(x86).

5) For Legacy video and stored tracker video, perform the following:

a) Copy the DVR from the \\Synologynas\root\public\IOAIDE setup to the C: drive:

i) Using the File Explorer as in step 2a, navigate to \\Synologynas\root\public\IOAIDE setup.

ii) Using a separate File Explorer as in step 2a, double click > This PC.

iii) Drag the DVR to  Local Disk (C:) 344 GB free of 465 GB .

b) If the shortcut for the DVR dvr - Shortcut is not on the desktop, execute steps c through e.

c) Using the File Explorer. Navigate to C:\DVR.

d) Right click on dvr.dvrconfig and click on Create shortcut.

e) Move the shortcut to the desktop.

6) For Salience Video data, do the following:

a) Copy Salience Video from \\Synologynas\root\public\IOAIDE setup to the desktop. See instructions for copying files in step 5.

7) Add Unified Database using SQLServer Management Studio:

a) Click the Windows icon ⊞ ->Microsoft SQL Server 2016->SQL Server Management Studio. The Connect to Server window appears on the screen. For the purposes of this report, the server name "juliette" is used as an example server name where IOAIDE is being installed, and in this case, also where the SQL Server databases reside (Fig. 10).

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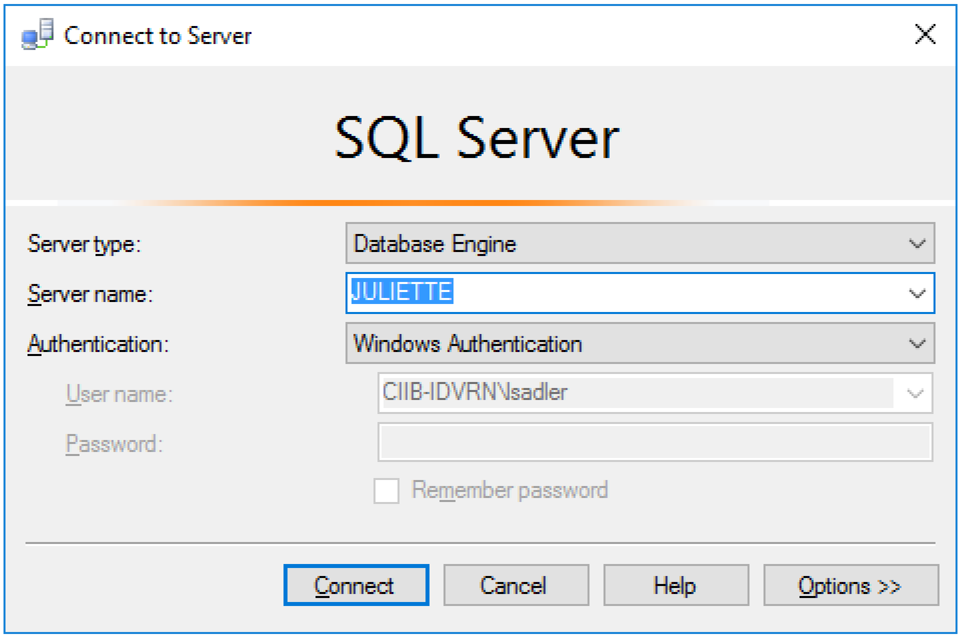


Server type: Database Engine

Server name: JULIETTE

Authentication: Windows Authentication

User name: CIIB-IDVRN\lsadler

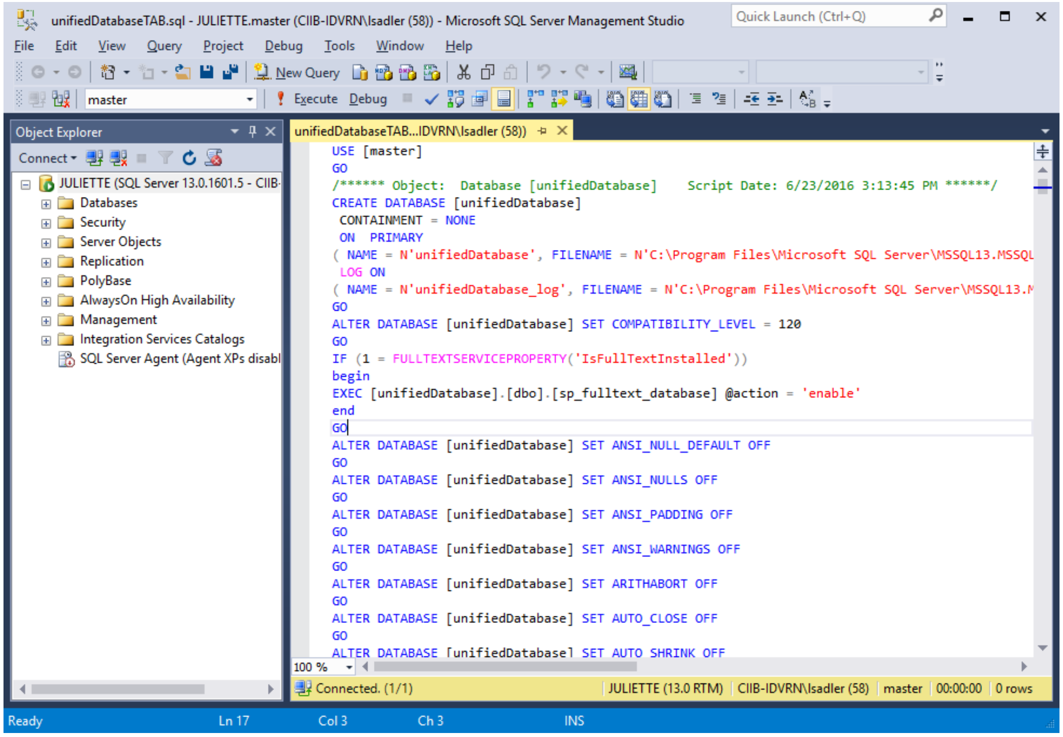
Password:

□ Remember password

Fig. 10 Connect to Server window

b) Click Connect.

c) In the upper-left corner of the SQL Server Management Studio window, click File->Open->File… (Fig. 11).



```
USE [master]
GO
/****** Object:  Database [unifiedDatabase]    Script Date: 6/23/2016 3:13:45 PM ******/
CREATE DATABASE [unifiedDatabase]
 CONTAINMENT = NONE
 ON  PRIMARY
( NAME = N'unifiedDatabase', FILENAME = N'C:\Program Files\Microsoft SQL Server\MSSQL13.MSSQL
 LOG ON
( NAME = N'unifiedDatabase_log', FILENAME = N'C:\Program Files\Microsoft SQL Server\MSSQL13.M
GO
ALTER DATABASE [unifiedDatabase] SET COMPATIBILITY_LEVEL = 120
GO
IF (1 = FULLTEXTSERVICEPROPERTY('IsFullTextInstalled'))
begin
EXEC [unifiedDatabase].[dbo].[sp_fulltext_database] @action = 'enable'
end
GO
ALTER DATABASE [unifiedDatabase] SET ANSI_NULL_DEFAULT OFF
GO
ALTER DATABASE [unifiedDatabase] SET ANSI_NULLS OFF
GO
ALTER DATABASE [unifiedDatabase] SET ANSI_PADDING OFF
GO
ALTER DATABASE [unifiedDatabase] SET ANSI_WARNINGS OFF
GO
ALTER DATABASE [unifiedDatabase] SET ARITHABORT OFF
GO
ALTER DATABASE [unifiedDatabase] SET AUTO_CLOSE OFF
GO
ALTER DATABASE [unifiedDatabase] SET AUTO_SHRINK OFF
```

Fig. 11 SQL Server Script window

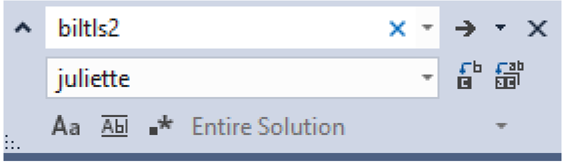
d) Navigate to C:\ARLDeveloper\Components\DatabaseScripts.

e) Click unifiedDatabase12-9-2016.sql. Click Open.

f) The script appears in a window. Click in the script window.

g) In the upper-left corner of the screen, navigate to Edit->Find and Replace->Quick Replace (see Fig. 11).

h) The Find and Replace Window appears in the upper-right corner of the SQL Server Window (Fig. 12).



biltls2

juliette

Fig. 12 Find and Replace window

i) Type “biltls2”, in the find top textbox and the name of the target computer (juliette, in this example) in the replace textbox just below (see Fig. 12).

j) Select .

k) Click ! Execute to run the script. This builds the database and as well as inserts the demo data (see Fig. 11).

l) Remember the name of the server in the top corner. It is needed for subsequent steps. In this example, the server is juliette (see Fig. 11).

m) Exit SQL Server Management Studio by clicking the ✕ in the upper-right corner (see Fig. 11).

8) Install ImageProcessing WebServices:

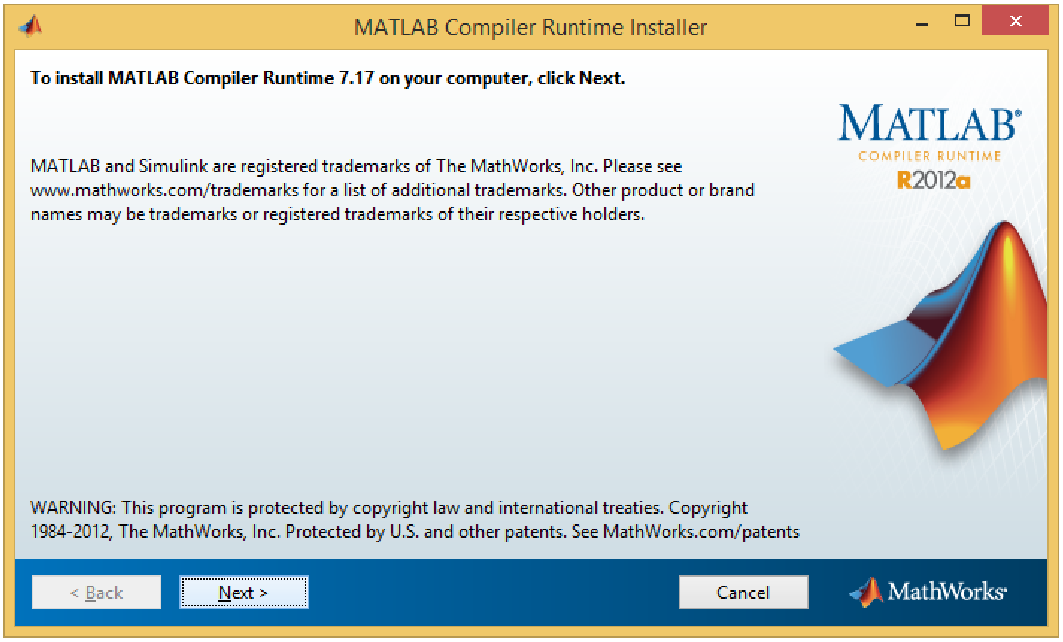
a) Run MCRinstaller:

i) Navigate to C:\ARLDeveloper\COTS\MatLabCompiler Runtime_7.17 and double click ☑ MCRInstaller.exe.

ii) The User Account Control window appears on the screen requesting permission to make changes to this computer (see Fig. 5).

iii) Click Yes in the User Account Control window.

iv) The MATLAB Compiler Runtime Installer window appears on the screen (Fig. 13).


MATLAB Compiler Runtime Installer
MATLAB® COMPILER RUNTIME R2012a
< Back
Next >
Cancel
MathWorks®

To install MATLAB Compiler Runtime 7.17 on your computer, click Next.

MATLAB and Simulink are registered trademarks of The MathWorks, Inc. Please see www.mathworks.com/trademarks for a list of additional trademarks. Other product or brand names may be trademarks or registered trademarks of their respective holders.

WARNING: This program is protected by copyright law and international treaties. Copyright 1984-2012, The MathWorks, Inc. Protected by U.S. and other patents. See MathWorks.com/patents

Fig. 13 MATLAB Compiler Runtime Installer

v) Click Next for all subsequent setup windows, using the defaults.

vi) Click Install.

b) Copy the folder: \\SynologyNAS\root\Public\cschlesiger\ ARLImage Processing\ImageProcessingRoot to C:\ImageProcessingRoot.

c) In the Explorer window, navigate to C:\ARLDeveloper\Components\ ARLImageProcessing.Host. Double click ARLImageProcessing.sln to open the Visual Studio project (Fig. 14).

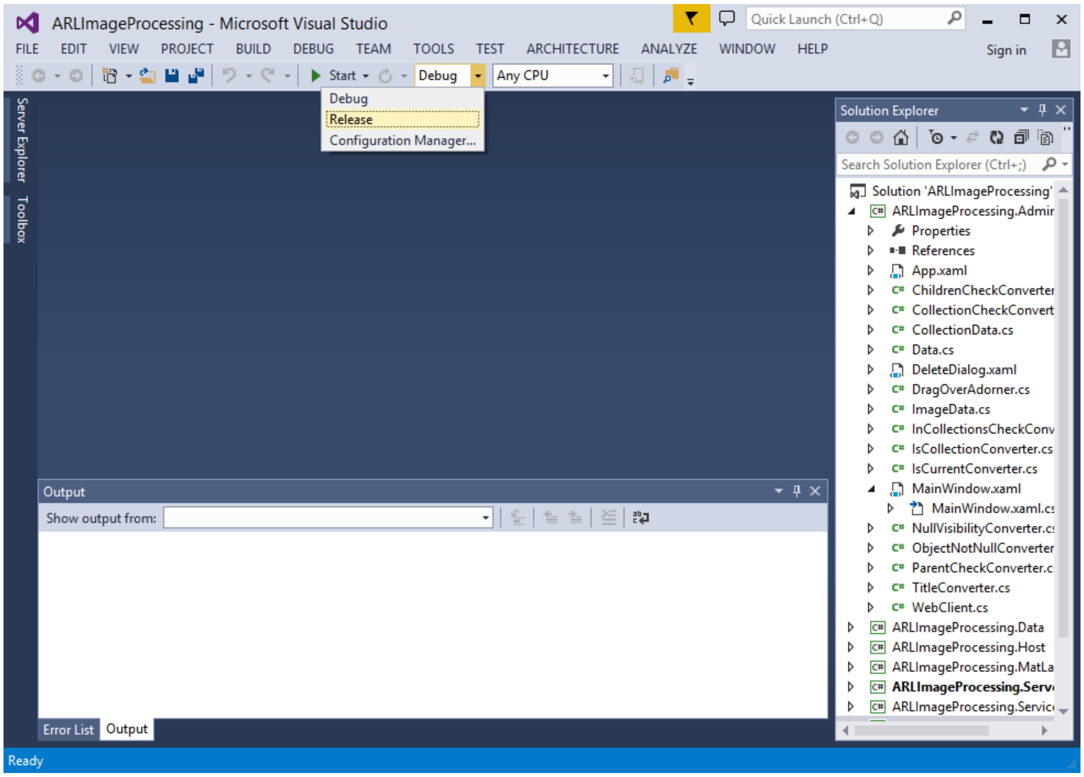
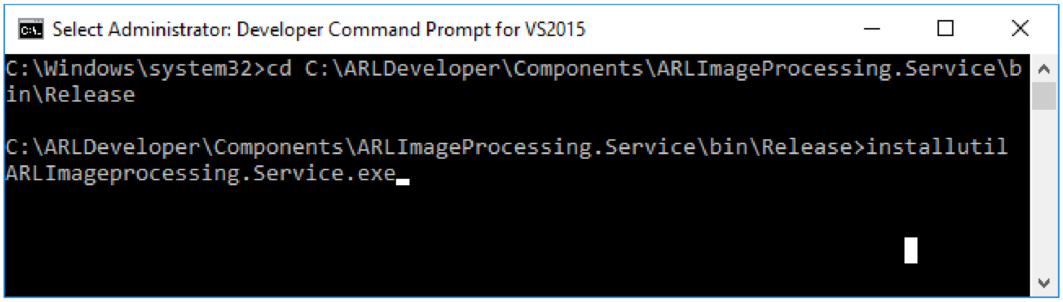


Fig. 14 Visual Studio: ARLImageProcessing.Host

d) Set build parameters to Release and Any CPU. Build the entire solution using the BUILD->Build Solution button at the top. This builds the project in Release mode, which places it in a folder designated for use by the Windows Service. Be sure to return to Debug mode for subsequent steps involving this Visual Studio project (see Fig. 14).

e) Open up the Developer Command Prompt for Visual Studio with Administrator privileges. To do this, click the Windows icon ->Visual Studio 2015 folder and right click Developer Command Prompt for … and left click ->More->Run as administrator.

f) A User Account Control window appears on the screen (see Fig. 5). Click Yes in the User Account Control window. The Developer Command Prompt for VS2015 window appears on the screen (Fig. 15).



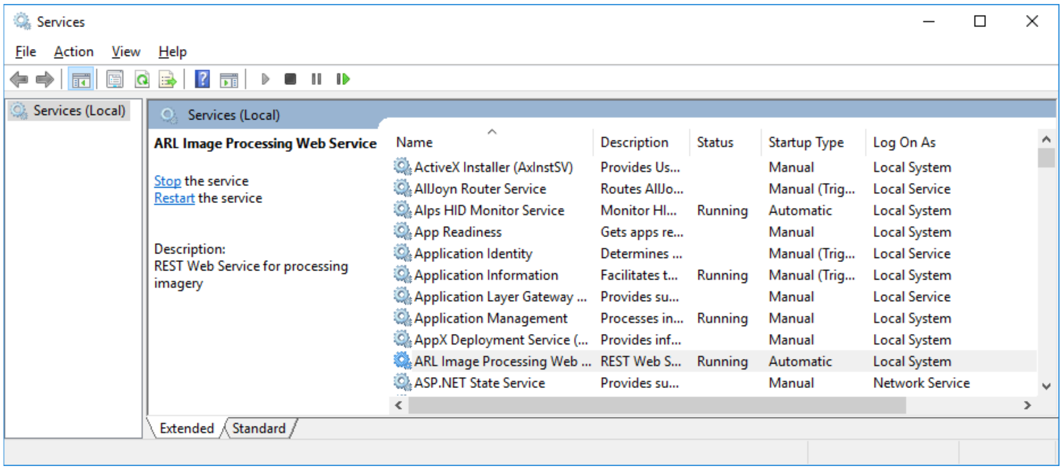
```
C:\Windows\system32>cd C:\ARLDeveloper\Components\ARLImageProcessing.Service\b
in\Release

C:\ARLDeveloper\Components\ARLImageProcessing.Service\bin\Release>installutil
ARLImageprocessing.Service.exe_
```

Fig. 15 Developer Command Prompt for VS2015

g) In the Developer Command Prompt for VS2015 window, navigate to the folder by typing “cd C:\ARLDeveloper\Components\ ARLImageProcessing.Service\bin\Release”, as shown in the first command line in Fig. 15.

h) Run the command: installutil ARLImageprocessing.Service.exe, as shown in the second command line in Fig. 15. The command should indicate success. Click the ✕ in the upper-right corner to exit the command prompt.

i) Start the web service by going to Services (right click the Windows icon ⊞ ->Control Panel->System and Security. In the popup window, select Administrative Tools. In the next popup window, select Services.) In the Services window, look for ARL Image Processing Web Service. It should already be set to start Automatic on reboot. To start it now, after the initial install, select it then click the Play button ▶ at the top of the window (or right click and select Start from the context menu) (Fig. 16).



ARL Image Processing Web Service

Stop the service
Restart the service

Description:
REST Web Service for processing imagery

Name	Description	Status	Startup Type	Log On As
ActiveX Installer (AxInstSV)	Provides Us...		Manual	Local System
AllJoyn Router Service	Routes AllJo...		Manual (Trig...	Local Service
Alps HID Monitor Service	Monitor HI...	Running	Automatic	Local System
App Readiness	Gets apps re...		Manual	Local System
Application Identity	Determines ...		Manual (Trig...	Local Service
Application Information	Facilitates t...	Running	Manual (Trig...	Local System
Application Layer Gateway ...	Provides su...		Manual	Local Service
Application Management	Processes in...	Running	Manual	Local System
AppX Deployment Service (...	Provides inf...		Manual	Local System
ARL Image Processing Web ...	REST Web S...	Running	Automatic	Local System
ASP.NET State Service	Provides su...		Manual	Network Service

Fig. 16 Services

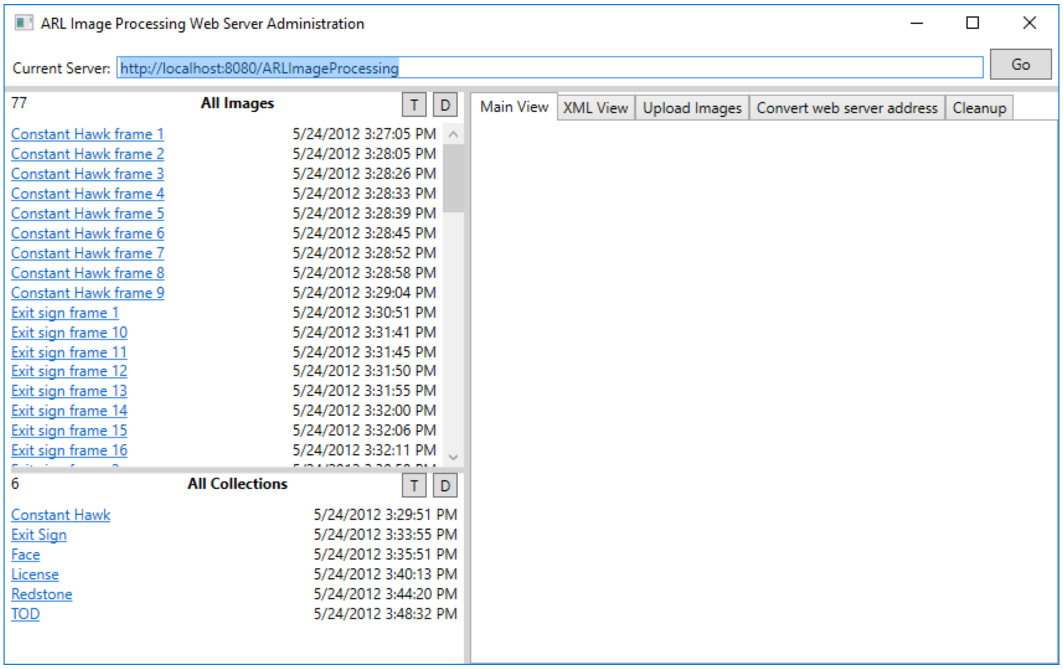
Approved for public release; distribution is unlimited.

j) Verify the service is running by launching the Admin tool:

I. Using the File Explorer, navigate to C:\ARLDeveloper\Components\ARLImageProcessing.Admin\bin\Release.

II. Double click ARLImageProcessing.Admin Application to execute. The ARL Image Processing Web Server Administration window appears on the screen. At the top of the ARL Image Processing Web Server Administration window, the address in the Current Server textbox should be http://localhost:8080/ARLImageProcessing (Fig. 17).

III. Click Go at the top right of the window. If the window populates with images and collections as shown on the left side of the window, the install was successful (Fig. 17).


ARL Image Processing Web Server Administration
Go
T
D
Main View
XML View
Upload Images
Convert web server address
Cleanup

Current Server: http://localhost:8080/ARLImageProcessing

77	All Images
Constant Hawk frame 1	5/24/2012 3:27:05 PM
Constant Hawk frame 2	5/24/2012 3:28:05 PM
Constant Hawk frame 3	5/24/2012 3:28:26 PM
Constant Hawk frame 4	5/24/2012 3:28:33 PM
Constant Hawk frame 5	5/24/2012 3:28:39 PM
Constant Hawk frame 6	5/24/2012 3:28:45 PM
Constant Hawk frame 7	5/24/2012 3:28:52 PM
Constant Hawk frame 8	5/24/2012 3:28:58 PM
Constant Hawk frame 9	5/24/2012 3:29:04 PM
Exit sign frame 1	5/24/2012 3:30:51 PM
Exit sign frame 10	5/24/2012 3:31:41 PM
Exit sign frame 11	5/24/2012 3:31:45 PM
Exit sign frame 12	5/24/2012 3:31:50 PM
Exit sign frame 13	5/24/2012 3:31:55 PM
Exit sign frame 14	5/24/2012 3:32:00 PM
Exit sign frame 15	5/24/2012 3:32:06 PM
Exit sign frame 16	5/24/2012 3:32:11 PM

6	All Collections
Constant Hawk	5/24/2012 3:29:51 PM
Exit Sign	5/24/2012 3:33:55 PM
Face	5/24/2012 3:35:51 PM
License	5/24/2012 3:40:13 PM
Redstone	5/24/2012 3:44:20 PM
TOD	5/24/2012 3:48:32 PM

Fig. 17 ARL Image Processing Web Server Administration

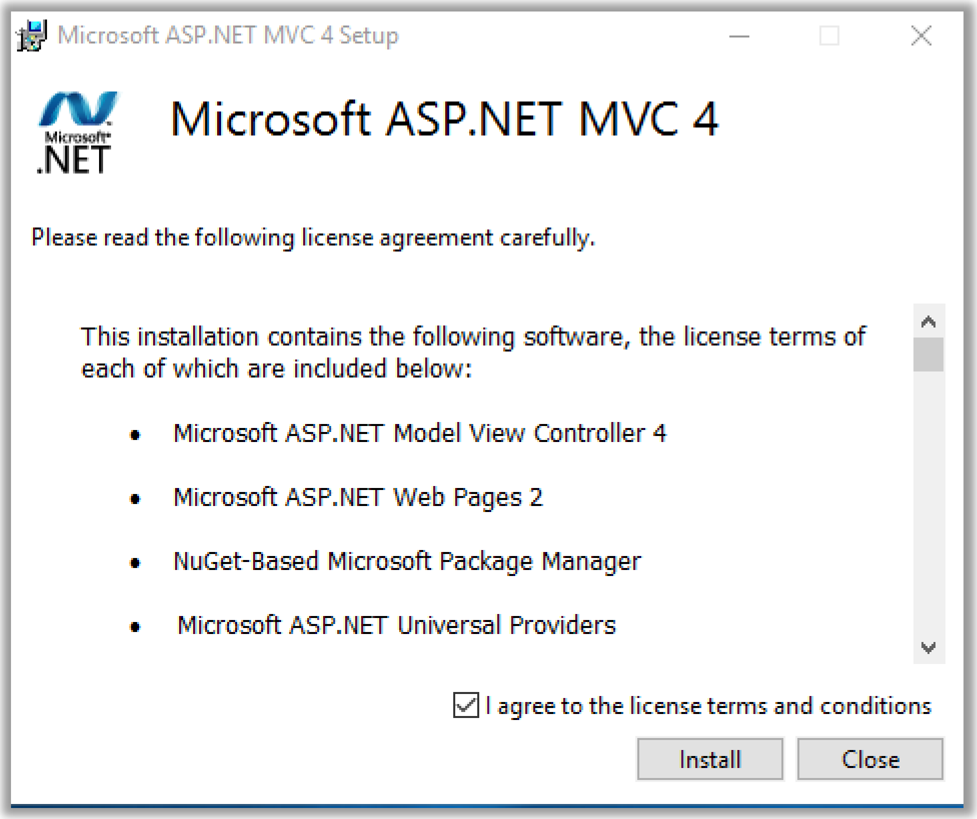
9) Install the Weather Digest WebServices:

a) Install ASP.NET MVC4:

i) Navigate to C:\ARLDeveloper\COTS\AspNetMVC4Setup.exe and double click AspNetMVC4Setup.exe .

ii) On the first window that appears, click on the checkbox to agree to the license terms and conditions (Fig. 18).

iii) Click on Install.



Microsoft ASP.NET MVC 4

Please read the following license agreement carefully.

This installation contains the following software, the license terms of each of which are included below:

- Microsoft ASP.NET Model View Controller 4
- Microsoft ASP.NET Web Pages 2
- NuGet-Based Microsoft Package Manager
- Microsoft ASP.NET Universal Providers

☑ I agree to the license terms and conditions

Fig. 18 Microsoft ASP.NET MVC 4 installation

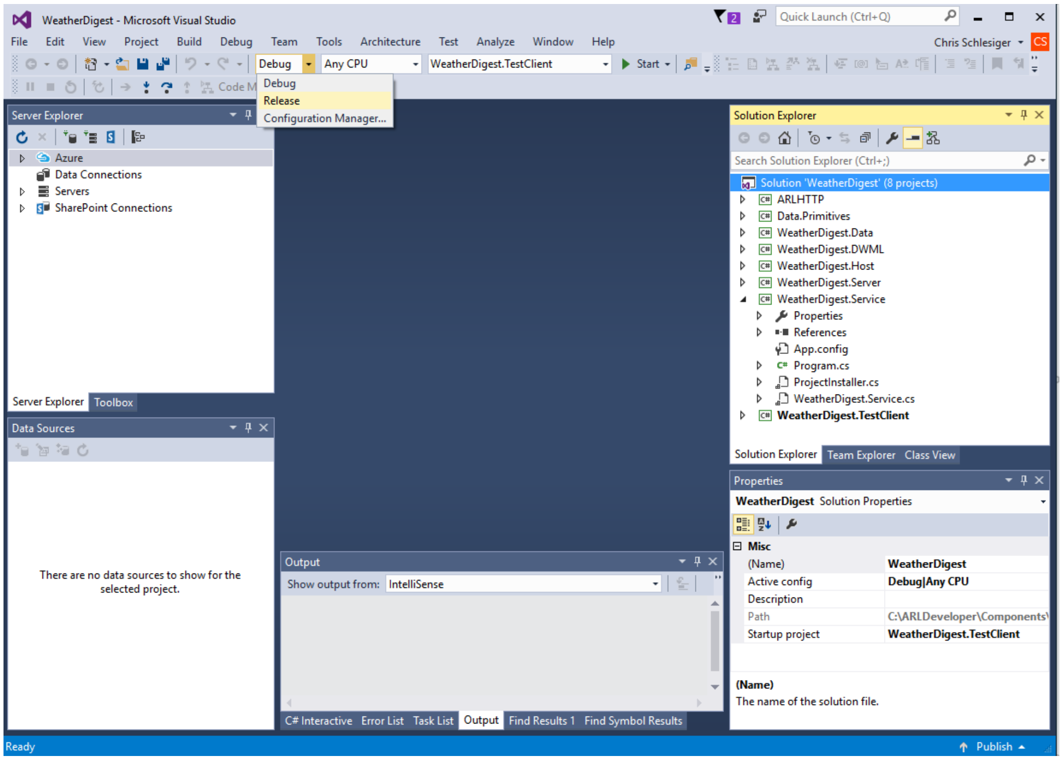
iv) The User Account Control window appears on the screen requesting permission to make changes to this computer (see Fig. 5).

v) Click Yes in the User Account Control window.

vi) Close the installer when it is complete.

b) Ensure the Tweetinvi COTS library has been checked out by verifying that the following folder and file exist: C:\ARLDeveloper\COTS\Tweetinvi\1.0\output\Tweetinvi.dll.

c) In the Explorer window, navigate to C:\ARLDeveloper\Components\WeatherDigest.Host. Double click WeatherDigest Solution to open the visual studio project (Fig. 19).



There are no data sources to show for the selected project.

Show output from: IntelliSense

WeatherDigest Solution Properties

Misc

(Name)	WeatherDigest
Active config	Debug|Any CPU
Description	
Path	C:\ARLDeveloper\Components\
Startup project	WeatherDigest.TestClient

(Name)
The name of the solution file.

Fig. 19 Visual Studio: WeatherDigest.sln

d) First, leave the build parameters set to Debug and Any CPU. Build the entire solution using the BUILD->Build Solution button at the top. This builds the project in debug mode, copying some important files to the bin\Debug folder.

e) Next, set the build parameters to Release and Any CPU. Build the entire solution using the BUILD->Build Solution button at the top. This builds the project in Release mode, which places it in a folder designated for use by the Windows Service. Be sure to return to Debug mode for subsequent steps involving this Visual Studio project (see Fig. 19).

f) In the File Explorer window, navigate to C:\ARLDeveloper\COTS\Tweetinvi\1.0. Copy the following 4 files and paste them into the C:\ARLDeveloper\Components\WeatherDigest.Service\bin\Release folder:

i) Autofac.dll

ii) Microsoft.Threading.Tasks.dll

iii) Microsoft.Threading.Tasks.Extensions.dll

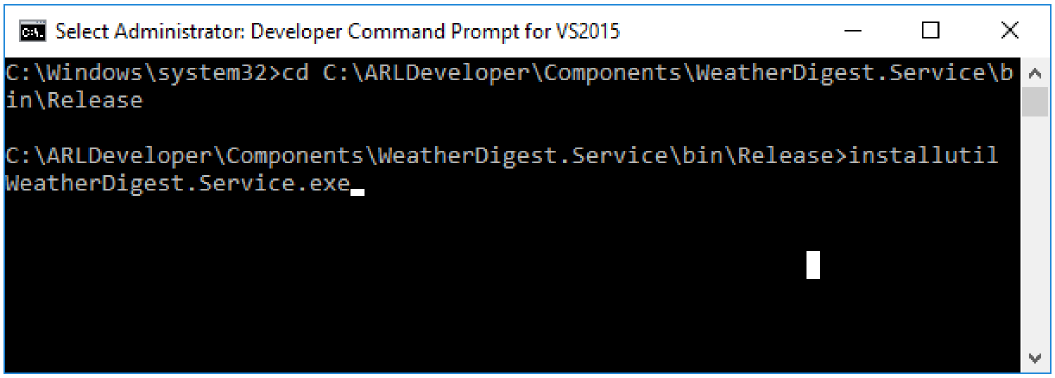
iv) Newtonsoft.Json.dll

g) Open up the Developer Command Prompt for Visual Studio with Administrator privileges. To do this, click the Windows icon ⊞->Visual Studio 2015 folder and right click Developer Command Prompt for … and left click ->More->Run as administrator.

h) A User Account Control window appears on the screen (see Fig. 5). Click Yes in the User Account Control window. The Developer Command Prompt for VS2015 window appears on the screen.

i) In the Developer Command Prompt for VS 2015 window navigate to the folder by typing “cd C:\ARLDeveloper\Components\WeatherDigest.Service\bin\Release”, as shown in the first command line in Fig. 20.

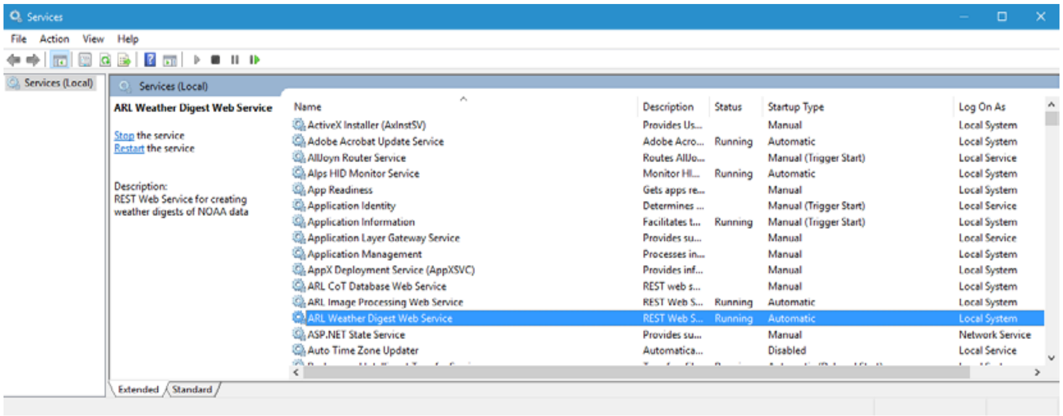
j) Run the command: installutil WeatherDigest.Service.exe, as shown in the second command line in Fig. 20. The command should indicate success. Click the ✕ in the upper-right corner to exit the command prompt.



```
C:\Windows\system32>cd C:\ARLDeveloper\Components\WeatherDigest.Service\b
in\Release

C:\ARLDeveloper\Components\WeatherDigest.Service\bin\Release>installutil
WeatherDigest.Service.exe_
```

Fig. 20 Developer Command Prompt for VS2015

k) Start the web service by going to Services (Right click the Windows icon ⊞ ->Control Panel->System and Security. In the popup window, select Administrative Tools. In the next popup window, select Services). In the Services window, look for ARL Weather Digest Web Service. It should already be set to start Automatic on reboot. To start it now, after the initial install, select it then click the Play button ▶ at the top of the window (or right click and select Start from the context enu) (Fig. 21).



ARL Weather Digest Web Service

Stop the service
Restart the service

Description:
REST Web Service for creating weather digests of NOAA data

Name	Description	Status	Startup Type	Log On As
ActiveX Installer (AxInstSV)	Provides Us...		Manual	Local System
Adobe Acrobat Update Service	Adobe Acro...	Running	Automatic	Local System
AllJoyn Router Service	Routes AllJo...		Manual (Trigger Start)	Local Service
Alps HID Monitor Service	Monitor HI...	Running	Automatic	Local System
App Readiness	Gets apps re...		Manual	Local System
Application Identity	Determines ...		Manual (Trigger Start)	Local Service
Application Information	Facilitates t...	Running	Manual (Trigger Start)	Local System
Application Layer Gateway Service	Provides su...		Manual	Local Service
Application Management	Processes in...		Manual	Local System
AppX Deployment Service (AppXSVC)	Provides inf...		Manual	Local System
ARL CoT Database Web Service	REST web s...		Manual	Local System
ARL Image Processing Web Service	REST Web S...	Running	Automatic	Local System
ARL Weather Digest Web Service	REST Web S...	Running	Automatic	Local System
ASP.NET State Service	Provides su...		Manual	Network Service
Auto Time Zone Updater	Automatica...		Disabled	Local Service

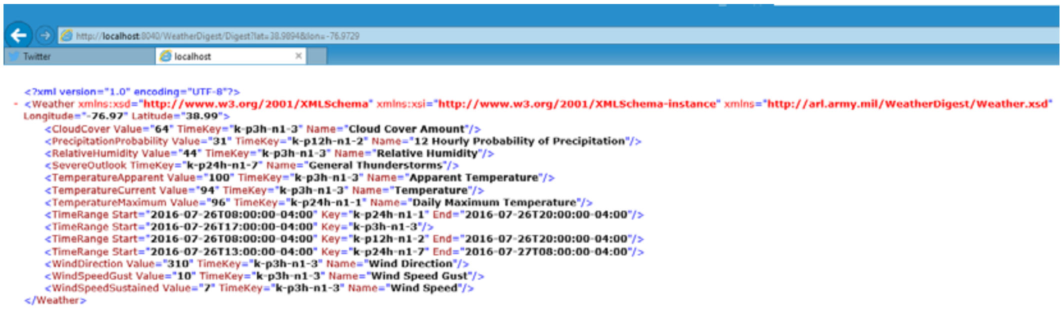
Fig. 21 Services

l) Verify the service is running by launching a web browser (e.g., Internet Explorer):

i) In the address bar of a new tab, type

http://localhost:8040/WeatherDigest/Digest?lat=38.9894&lon=-76.9729

ii) The resulting output should resemble the output shown in Fig. 22.

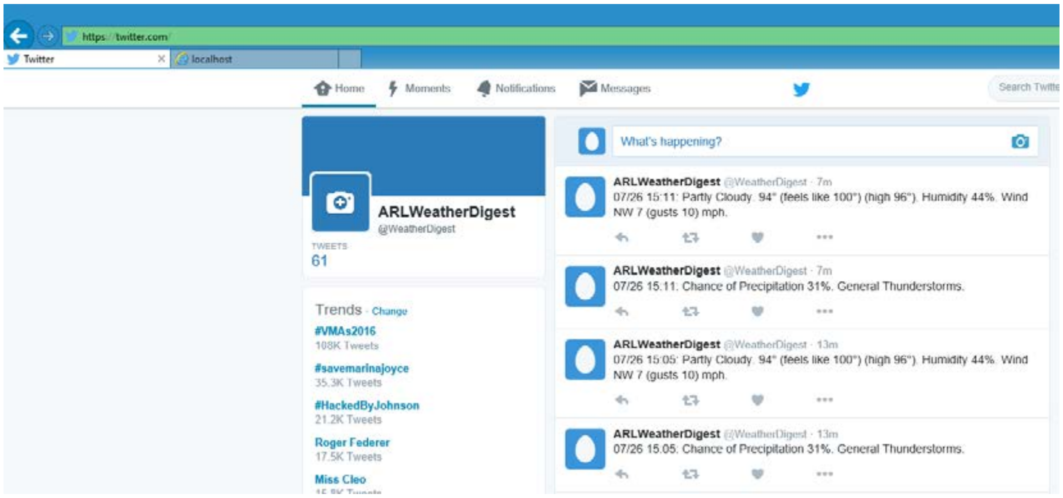


http://localhost:8040/WeatherDigest/Digest?lat=38.9894&lon=-76.9729
Twitter
localhost

```
  <?xml version="1.0" encoding="UTF-8"?>
- <Weather xmlns:xsd="http://www.w3.org/2001/XMLSchema" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://arl.army.mil/WeatherDigest/Weather.xsd"
  Longitude="-76.97" Latitude="38.99">
     <CloudCover Value="64" TimeKey="k-p3h-n1-3" Name="Cloud Cover Amount"/>
     <PrecipitationProbability Value="31" TimeKey="k-p12h-n1-2" Name="12 Hourly Probability of Precipitation"/>
     <RelativeHumidity Value="44" TimeKey="k-p3h-n1-3" Name="Relative Humidity"/>
     <SevereOutlook TimeKey="k-p24h-n1-7" Name="General Thunderstorms"/>
     <TemperatureApparent Value="100" TimeKey="k-p3h-n1-3" Name="Apparent Temperature"/>
     <TemperatureCurrent Value="94" TimeKey="k-p3h-n1-3" Name="Temperature"/>
     <TemperatureMaximum Value="96" TimeKey="k-p24h-n1-1" Name="Daily Maximum Temperature"/>
     <TimeRange Start="2016-07-26T08:00:00-04:00" Key="k-p24h-n1-1" End="2016-07-26T20:00:00-04:00"/>
     <TimeRange Start="2016-07-26T17:00:00-04:00" Key="k-p3h-n1-3"/>
     <TimeRange Start="2016-07-26T08:00:00-04:00" Key="k-p12h-n1-2" End="2016-07-26T20:00:00-04:00"/>
     <TimeRange Start="2016-07-26T13:00:00-04:00" Key="k-p24h-n1-7" End="2016-07-27T08:00:00-04:00"/>
     <WindDirection Value="310" TimeKey="k-p3h-n1-3" Name="Wind Direction"/>
     <WindSpeedGust Value="10" TimeKey="k-p3h-n1-3" Name="Wind Speed Gust"/>
     <WindSpeedSustained Value="7" TimeKey="k-p3h-n1-3" Name="Wind Speed"/>
  </Weather>
```

Fig. 22 Internet Explorer Weather Digest test

iii) Verify that tweets were sent out by logging into Twitter at https://twitter.com. The login name is ARLWeatherDigest@gmail.com and the password is provided by the administrator. There should be tweets corresponding to the date and time of the test just run similar to what is shown in Fig. 23.



https://twitter.com/

Twitter

localhost

Home Moments Notifications Messages

Search Twitter

ARLWeatherDigest
@WeatherDigest

TWEETS
61

Trends · Change

#VMAs2016
108K Tweets

#savemarinajoyce
35.3K Tweets

#HackedByJohnson
21.2K Tweets

Roger Federer
17.5K Tweets

Miss Cleo

What's happening?

ARLWeatherDigest @WeatherDigest · 7m
07/26 15:11: Partly Cloudy. 94° (feels like 100°) (high 96°). Humidity 44%. Wind NW 7 (gusts 10) mph.

ARLWeatherDigest @WeatherDigest · 7m
07/26 15:11: Chance of Precipitation 31%. General Thunderstorms.

ARLWeatherDigest @WeatherDigest · 13m
07/26 15:05: Partly Cloudy. 94° (feels like 100°) (high 96°). Humidity 44%. Wind NW 7 (gusts 10) mph.

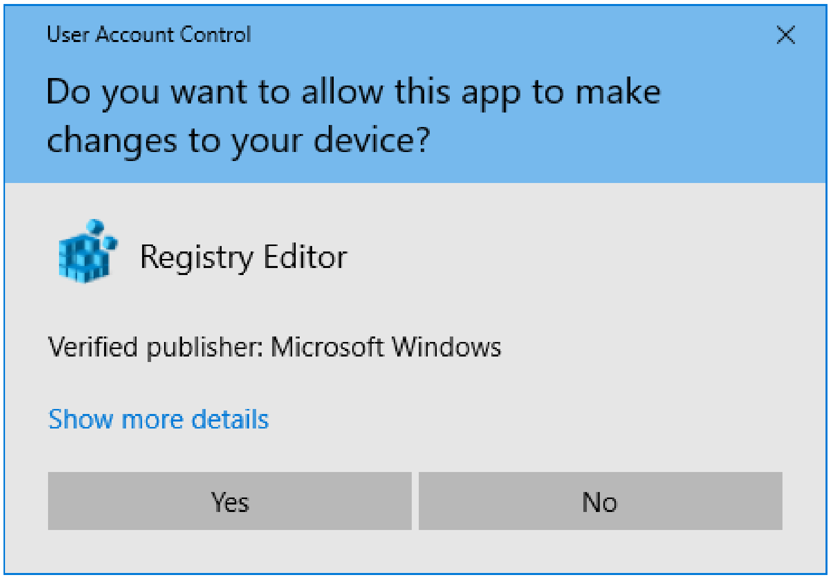
ARLWeatherDigest @WeatherDigest · 13m
07/26 15:05: Chance of Precipitation 31%. General Thunderstorms.

Fig. 23 Internet Explorer Weather Digest Twitter test

3.4 Update Java Setting in Regedit

The following are the steps for updating the Java setting so IOAIDE can navigate the web:

1) Right click the Windows icon ⊞, select Run, type **regedit** in the Open: textbox, and then click OK . The User Account Control popup Window appears on the screen (Fig. 24).



User Account Control

Do you want to allow this app to make changes to your device?

Registry Editor

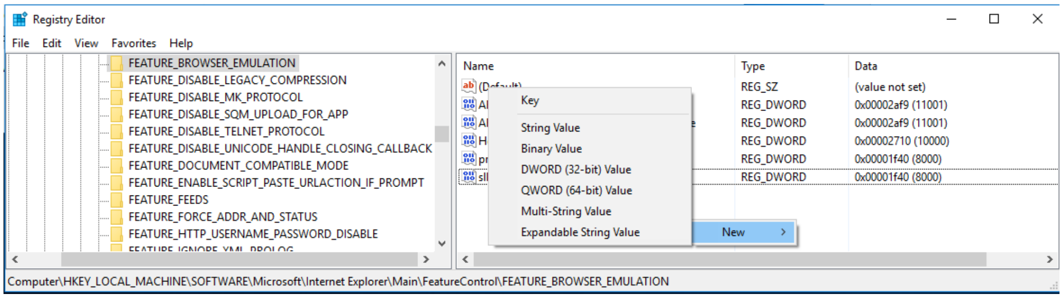
Verified publisher: Microsoft Windows

Show more details

Yes No

Fig. 24 User Account Control for regedit

2) Click Yes. The Registry Editor popup window appears on the screen (Fig. 25).



FEATURE_BROWSER_EMULATION
FEATURE_DISABLE_LEGACY_COMPRESSION
FEATURE_DISABLE_MK_PROTOCOL
FEATURE_DISABLE_SQM_UPLOAD_FOR_APP
FEATURE_DISABLE_TELNET_PROTOCOL
FEATURE_DISABLE_UNICODE_HANDLE_CLOSING_CALLBACK
FEATURE_DOCUMENT_COMPATIBLE_MODE
FEATURE_ENABLE_SCRIPT_PASTE_URLACTION_IF_PROMPT
FEATURE_FEEDS
FEATURE_FORCE_ADDR_AND_STATUS
FEATURE_HTTP_USERNAME_PASSWORD_DISABLE

Name	Type	Data
(Default)	REG_SZ	(value not set)
Al	REG_DWORD	0x00002af9 (11001)
Al	REG_DWORD	0x00002af9 (11001)
H	REG_DWORD	0x00002710 (10000)
pr	REG_DWORD	0x00001f40 (8000)
sll	REG_DWORD	0x00001f40 (8000)

Computer\HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Internet Explorer\Main\FeatureControl\FEATURE_BROWSER_EMULATION

Fig. 25 Registry Editor

3) In the left-most panel, navigate to HKEY_LOCAL_MACHINE->SOFTWARE->Microsoft->InternetExplorer->Main->FeatureControl->FEATURE_BROWSER_EMULATION (see Fig. 25).

4) In right panel, right click and select New->DWORD (32-bit) Value (see Fig. 25).

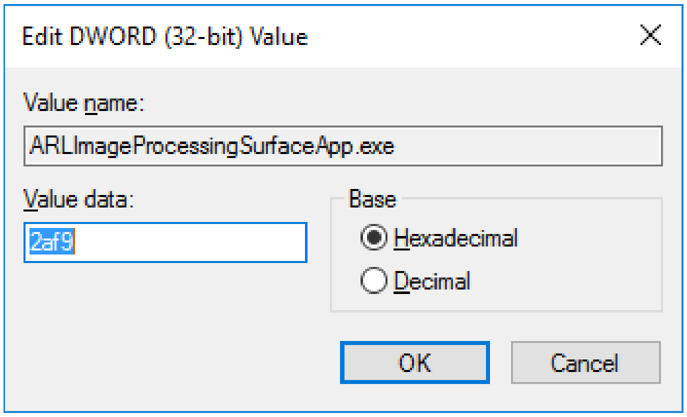
5) Modify New Value #1 to ARLImageProcessingSurfaceApp.exe.

6) Right click ARLImageProcessingSurfaceApp.exe and click Modify....

7) The Edit DWORD (32-bit) Value window appears on the screen (Fig. 26).

8) Type **2af9** in Value data textbox (Fig. 26).

9) Click OK.



Edit DWORD (32-bit) Value

Value name:
ARLImageProcessingSurfaceApp.exe

Value data:
2af9

Base
● Hexadecimal
○ Decimal

Fig. 26 Edit DWORD (32-bit) Value

10) In right panel, right click and select New->DWORD (32-bit) Value again (see Fig. 25).

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11) Modify New Value #1 to ARLImageProcessingSurfaceApp.vshost.exe.

12) Right click ARLImageProcessingSurfaceApp.exe and click “Modify....”

13) The Edit DWORD (32-bit) Value window appears on the computer screen. Type **2af9** in Value data textbox (see Fig. 26).

14) Click OK (see Fig. 26).

15) Exit the Registry Editor by clicking the ✕ in the upper-right corner.

3.5 Build the IOAIDE Software Packages

The following are the steps for building the IOAIDE software packages:

1) Using the File Explorer, navigate to C:\ARLDeveloper\Components\ARLImageProcessing.Win8App. Double click ARLImageProcessing.SurfaceApp.sln or ARLImageProcessing.SurfaceApp with the type defined as Microsoft Visual Studio Solution to open the project in Visual Studio (Fig. 27).

2) In the Solution Explorer window on the right, make sure ARLImageProcessing.SurfaceApp is set as the startup project. **ARLImageProcessing.SurfaceApp** is in **bold** letters if it is set as the Startup project. If not, then right click ARLImageProcessing.SurfaceApp and select “Set as Startup Project” (Fig. 27).

3) Set the build configuration Debug and x64 as shown in Fig. 27.

4) Right click ARLImageProcessing.SurfaceApp and select Build (Fig. 27).

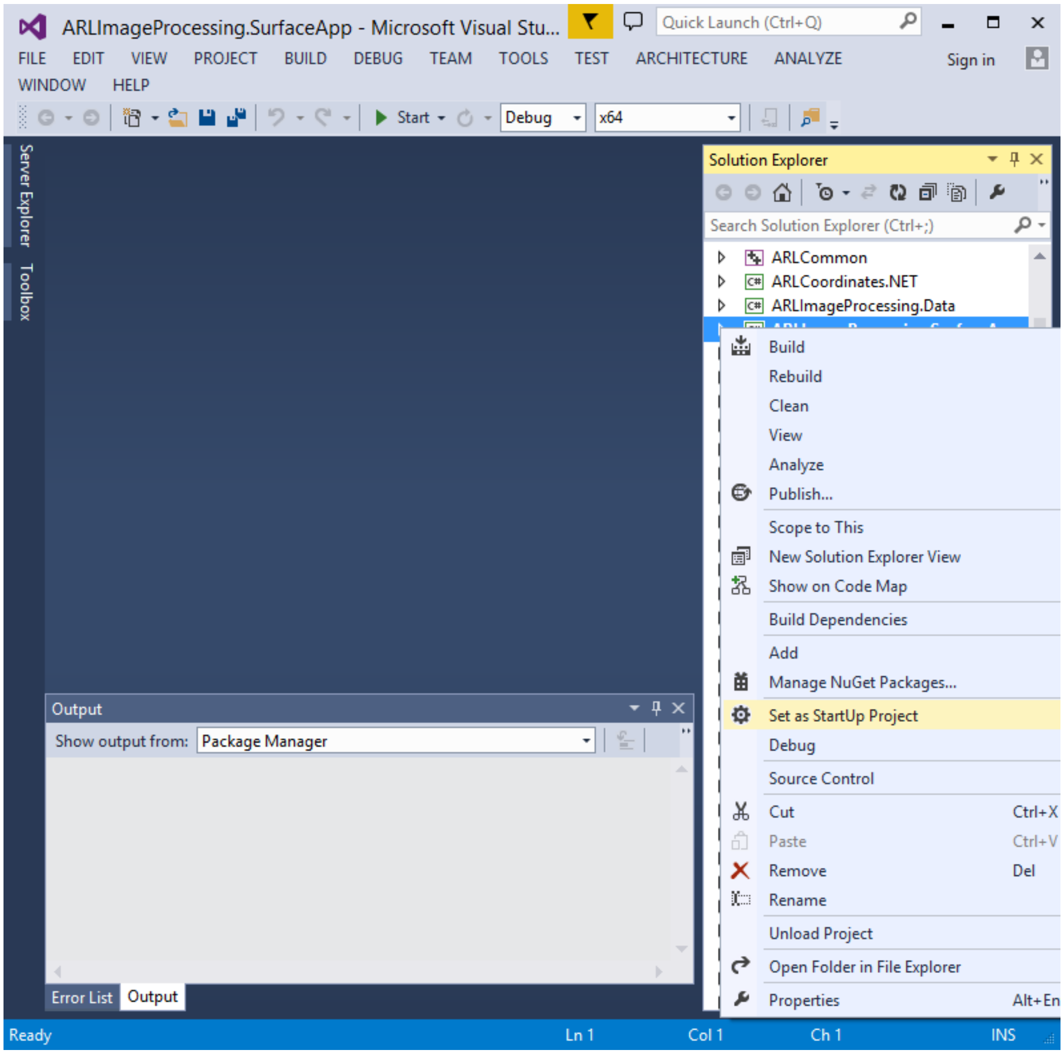

Fig. 27 Visual Studio: ARLImageProcessing.SurfaceApp

5) Exit Visual Studio by clicking the × in the upper-right corner.

3.6 Build DSProTest

The following are the steps for building DSProTest:

1) Using the File Explorer, navigate to C:ARLDeveloper\Components\DSProTest. Double click the DSProTest.sln or DSProTest with the type defined as Microsoft Visual Studio Solution to open the project in Visual Studio.

2) In the Solution Explorer window on the right, make sure DSProTest is set as the startup project. **DSProTest** is in **bold** letters if it is set as the Startup project. If not, right click DSProTest and select ‘Set as Startup Project’.

3) Set the build configuration Debug and x64 as shown in Fig. 27.

4) Right click **DSProTest** and select Build. Fig. 27.

5) Exit Visual Studio by clicking the × in the upper-right corner.

3.7 Copy IOAIDE and Dependencies Shortcuts to Executables

The following are the steps for copying the IOAIDE and dependencies shortcuts to create executables:

1) Copy IOAIDE Startup from \\Synologynas\root\public\IOAIDE setup to the desktop.

2) See the instructions for copying files in Section 3.3, step 5.

4. Execute IOAIDE and Dependencies in Development/Debug Mode

This section describes each step necessary to execute IOAIDE and dependencies software in a development environment. A demonstration can also be given in this mode of operation.

1) Start the DVR:

   a) If using stored data (needed for the anomaly detection demo) for the video (not necessary for .avi files.), on the desktop, double click GO to start the network and double click dvr - Shortcut to start the dvr client.

2) Run DSPro:

   a) Delete the DSPro database from previous runs if it exists. Using the File Explorer, navigate to C:\Nomads\aci\cpp\dspro2\win32. Delete the file with the extension .sqlite.

   b) In this directory, double click dsro2.sln to open the DSPro project in Visual Studio (see Fig. 9). Make sure dsPro2Launcher is the startup project. **dsPro2Launcher** should be in **bold** if it is the StartUp Project. If it is not, right click dsPro2Launcher and select Set as StartUp Project. Run dsPro2Launcher in the debugger by clicking ▶ Local Windows Debugger ▾.

c) Click Yes, when asked to build projects that are out of date.

3) Run IOAIDE:

   a) Navigate to C:\ARLDeveloper\Components\ARLImageProcessing.Win8App. Double click ARLImageProcessing.SurfaceApp.sln to open it in Visual Studio (see Fig. 27).

   b) Run IOAIDE in the debugger by clicking ▶ Start ▾.

   c) In the Data Query tab Data Query, open a DSPro Window by clicking **DSPro Window** and connect to DSPro by clicking Connect to DSPro.

4) Run DSProTest:

   a) If it is desired that new incoming data from sensors or Android devices be stored in the Unified database to be queried by IOAIDE, then DSProTest must also be running.

   b) Navigate to C:\ARLDeveloper\Components\DSProTest. Double click DSProTest.sln to open it in Visual Studio (see Fig. 27).

   c) Run DSProTest in the debugger by clicking ▶ Start ▾.

   d) In the MainWindow of DSProTest, connect to DSPro by clicking Connect to DSPro and set Display Image = No by clicking Display Image = Yes. It now says Display Image = No.

5. Execute IOAIDE and Dependencies from Shortcuts and Executables

If the IOAIDE startup folder does not exist on the desktop, it is necessary to make the shortcuts before starting:

1) Create a new folder on the desktop entitled “IOAIDE Startup”.

2) Make a shortcut for IOAIDE:

   a) In the File Explorer window in Section, 3.3, step 2a, navigate to C:\ARLDeveloper\Components\ARLImageProcessing.Win8App\bin\x64\Debug.

b) Right click ARLImageProcessing.SurfaceApp.exe and select Create shortcut.

c) Copy ARLImageProcessing.SurfaceApp.exe-Shortcut to the IOAIDE Startup folder on the desktop.

3) Make a shortcut for DSPro2Launcher:

   a) In the File Explorer window in Section 3.3, step 2a, navigate to C:\Nomads\aci\cpp\dspro2\win32\Debug.

   b) Right click on the Application DSPro2Launcher and select Create shortcut.

   c) Right click DSPro2Launcher-Shortcut and select Properties.

   d) The Target: Textbox should contain: C:\Nomads\aci\cpp\dspro2\win32\Debug\DSPro2Launcher.exe.

   e) Add the following text:

      -c C:\Nomads\aci\conf\onrdemo-sen.properties
      -e C:\Nomads\aci\conf \dspro.metadata.extraattributes.xml
      -v C:\Nomads\aci\conf \dspro.metadata.extravalues.xml

   f) The Target: Textbox should now contain the following:

      C:\Nomads\aci\cpp\dspro2\win32\Debug\DSPro2Launcher.exe
      -c C:\Nomads\aci\conf\onrdemo-sen.properties
      -e C:\Nomads\aci\conf \dspro.metadata.extraattributes.xml
      -v C:\Nomads\aci\conf \dspro.metadata.extravalues.xml

   g) Click OK.

   h) Copy the DSPro2Launcher-Shortcut to the IOAIDE Startup folder on the desktop.

4) Make a shortcut for DSProTest:

   a) In the File Explorer window in Section 3.3, step 2a, navigate to C:\ARLDeveloper\Components\DSProTest\bin\x64\Debug.

   b) Right click DSProTest.exe and select Create shortcut.

   c) Copy DSProTest.exe-Shortcut to the IOAIDE Startup folder on the desktop.

This following describes each step necessary to execute IOAIDE and dependencies software in a user/demonstration/experiment mode/environment:

1) Start the DVR:

   a) If using stored data (needed for the anomaly detection demo) for the video (not necessary for .avi files.), on the desktop, double click GO to start the network.

   b) Double click dvr - Shortcut to start the dvr client.

2) Run DSPro:

   a) Open the IOAIDE Startup folder on the desktop.

   b) Click the DSPro2Launcher shortcut icon.

3) Run IOAIDE:

   a) Open the IOAIDE Startup folder on the desktop.

   b) Click the IOAIDE shortcut icon.

   c) In the Data Query tab Data Query, open a DSPro window by clicking DSPro Window and connect to DSPro by clicking Connect to DSPro.

4) Run DSProTest:

   a) If it is desired that new incoming data from sensors or Android devices be stored in the Unified database to be queried by IOAIDE, then DSProTest must also be running.

   b) Open the IOAIDE Startup folder on the desktop.

   c) Click the DSProTest shortcut icon.

   d) In the MainWindow of DSProTest, connect to DSPro by clicking Connect to DSPro and set Display Image = No by clicking Display Image = Yes. It now says Display Image = No.

6. Conclusion

The IOAIDE application is still under development. It is designed to be extensible, allowing for the addition of new enhancement applications and algorithms to the existing modules as they become available. It can accommodate new research areas by adding additional modules. This report described all the steps required to initialize a computer with all the required software to develop and run the IOAIDE application in its current state. The installation process involves many steps due to dependencies on other software applications. This document will need to be updated with the addition of new software dependencies.

7. References

1. Sadler LC, Michaelis JR. An information management framework for C2 data analysis in tactical operations centers. Proceedings of the 21st International Command and Control Research and Technology Symposium; 2016 Sep 6–8; London, UK.

2. Winkler RP, Schlesiger C. Image processing REST web services. Adelphi (MD): Army Research Laboratory (US); 2013 Mar. Report No.: ARL-TR-6393.

3. Mazzini A, Stefanelli C, Tortonesi M, Benincasa G, Suri N. Disservice: network state monitoring and prediction for opportunistic information dissemination in tactical networks. In Military Communications Conference, 2010-MILCOM: IEEE; 2010. p. 555–560.

4. Suri N, Benincasa G, Lenzi R, Tortonesi M, Stefanelli C, Sadler L. Exploring value-of-information-based approaches to support effective communications in tactical networks. Communications Magazine. 2015;IEEE 53(10):39–45.

1 (PDF)	DEFENSE TECHNICAL INFORMATION CTR DTIC OCA
2 (PDF)	DIRECTOR US ARMY RESEARCH LAB RDRL CIO L IMAL HRA MAIL & RECORDS MGMT
1 (PDF)	GOVT PRINTG OFC A MALHOTRA
2 (PDF)	DIRECTOR US ARMY RESEARCH LAB RDRL CII B LC SADLER CD SCHLESIGER