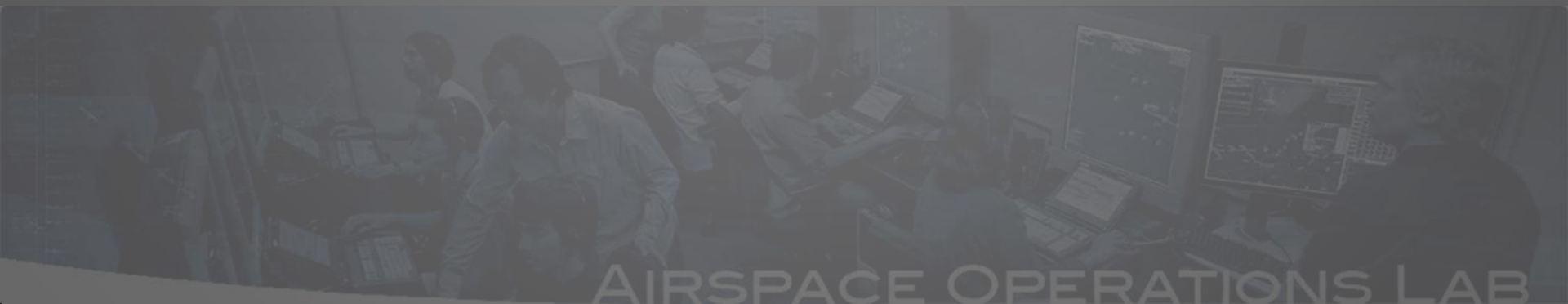
Getting Started with MACS: Installation, directory overview, launching

Chris Cabrall



Outline

- System requirements
- Installation
  - Stand-alone application on a single computer
  - Networked simulation platform across multiple computers
    - ADRS
- MACS files and folders overview
  - Organization
  - Principle files (some of the major players)
- How to start and run MACS
  - .bat file shortcuts

System Requirements

- Minimal (depending on what you ask it do single pilot vs. MSP)

  -number of processes, aircraft, displays, etc.

  -data collection requirements (calculations/computations per X secs)

  Guidelines

- Any off-the-shelf mid-range or high-end computer with capable graphics and processing power (e.g. 2008 or newer)
- 4 GB of minimum system memory is recommended
- 120 MB of minimum available disk space

- Recent version of java (www.java.com)
- It can be either the 32 bit or 64 bit version

Installation (stand-alone)

On a single computer

- Useful for off-line testing and development, with no connections needed to anything else

1) Create a new folder called “Experiments” on the top level of your local hard drive, e.g. C:\Experiments\
2) Copy and paste the “Example_ZKC_ZID” and the “Example_ZLA” folders

from:

D:\MACS_Install_Stand_Alone\

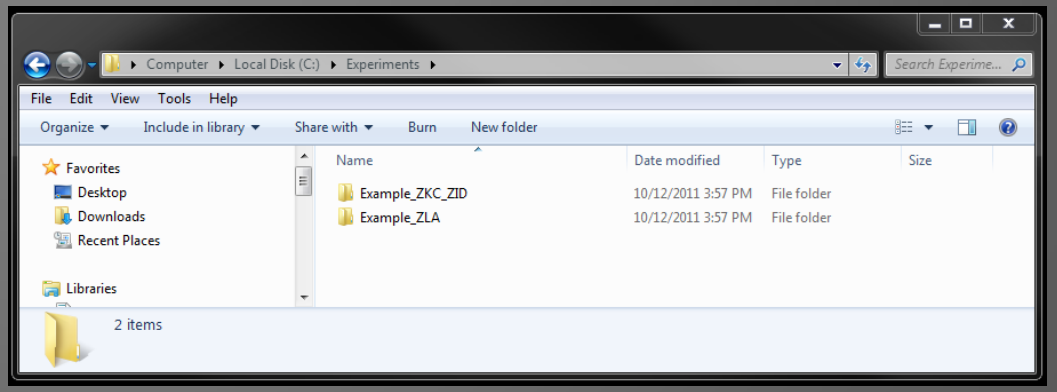
into:

C:\Experiments\

result:

C:\Experiments\Example_ZKC_ZID\

C:\Experiments\Example_ZLA\



Installation (networked)

On a network “share drive” server

- To be distributed and accessed (via SHORTCUTS) from multiple computers simultaneously for real-time human-in-the-loop simulations.
- Only Java needs to be on each separate networked workstation

1) Create a new folder called “Experiments” on the top level of your “share drive” server, e.g. Z:\Experiments\
2) Copy and paste the “Example_ZKC_ZID” and the “Example_ZLA” folders

from:

D:\MACS_Install_Networked\

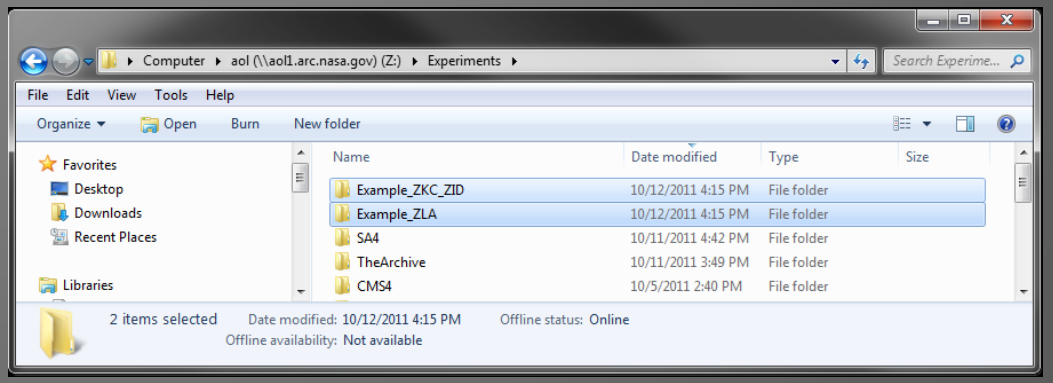
into:

Z:\Experiments\

result:

Z:\Experiments\Example_ZKC_ZID\

Z:\Experiments\Example_ZLA\

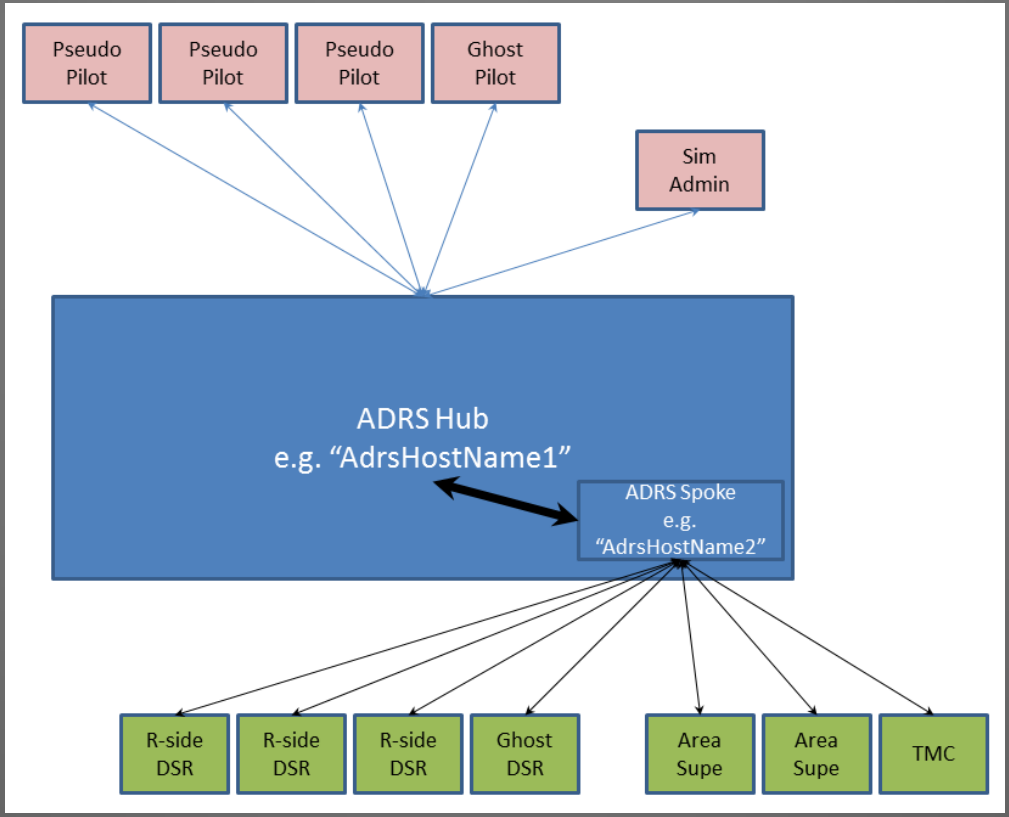


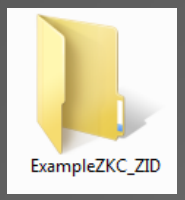
Installation (networked)

- For distributed simulations, you will need the ADRS
- What is the ADRS?
  - Aeronautical Datalink and Radar Simulator
  - The communication bridge between networked MACS workstations (the way MACS stations talk to each other)
  - Simulates various types of surveillance source data (radar, ads-b, etc.)
  - Communicates data link messages between macs stations
  - NOTE: the ADRS has its own database (similar to MACS' MACSAirspace directory)
- How to install ADRS? (vaibhav.kelkar@nasa.gov)
  - We recommend using the ADRS on a linux machine…
  - Installation will vary based on your linux environment
- How to launch the ADRS?
  - >: cd [your_adrs_home_directory]\aero_dlnk_radar_str\realtime_procs\
  - …\realtime_procs\ >: adrs –data [main ADRS airspace adaptation]
  - EXAMPLE …\realtime_procs\ >: adrs –data ZID_SDF

Installation (networked)

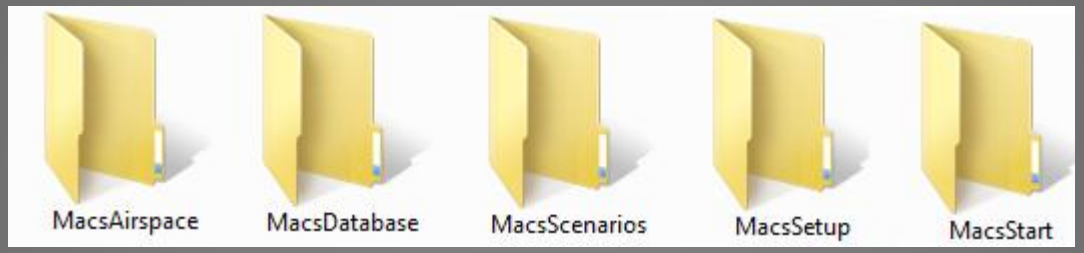
- Hub (pilot stations, simulation admin) and Spoke (ATC stations)
- How to launch the spoke ADRS?
  - …\realtime_procs\ >: adrs –data [main ADRS airspace adaptation] –add_adrs [hostname of hub adrs]
  - EXAMPLE …\realtime_procs\ >: adrs –data ZID_SDF –add_adrs AdrsHostName1



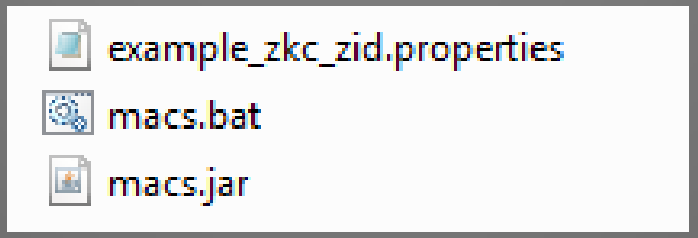


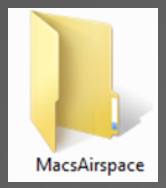
MACS Files and Folders

- At the top level within C:\Experiments\Example_ZKC_ZID\
  - 5 major directory folders



  - High level and central MACS files





MACS_Airspace

Contains the files for defining a particular airspace adaptation of interest:

- Airports
- Waypoints
- Sector boundaries
- Airways/jet-routes

Etc.

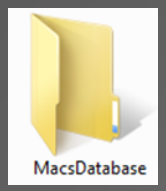
Organized into:

-NAS_Wide (self-explanatory)

-Airspaces

Primary airspace – required (e.g. ZID_SDF)
Secondary airspace(s) – optional (e.g. ZAU, ZKC, ZME)

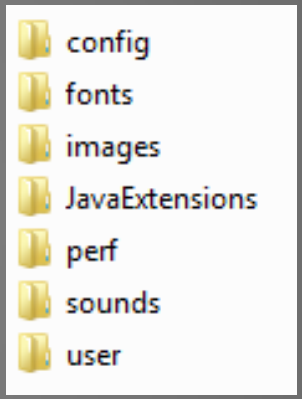
- NAVDB\
- CUSTOM\
- VIDEO MAPS\

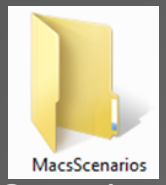


MACS_Database

Contains pilot configuration and various MACS “system” files

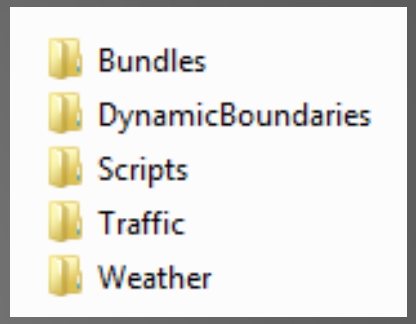
- Config\ – pilot configuration files for determining which
  planes a pilot station will have ownership of/access to (e.g. zkc90)
- Fonts\, Images\, Sounds\ – self explanatory
- JavaExtensions\– for add-on functionality, e.g. speech synthesis , some scripting, etc.
- Perf\ – aircraft performance specifications
- User\ – screen layouts/sizes, which windows where on which tabs





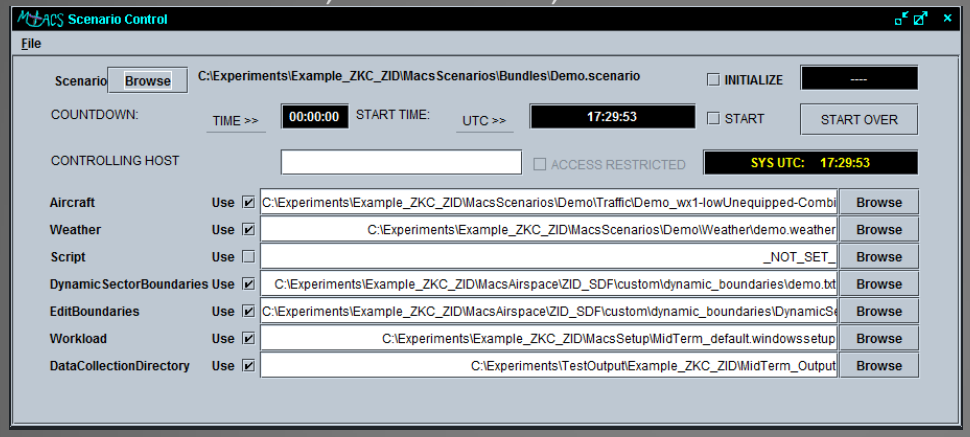
MACS_Scenarios

Contains the files related to experimental setup for different conditions\runs



Bundles\

-run1.scenario, run2.scenario, etc.



Dynamic Boundaries\

-EditOptions\, ScriptedBoundaries\, rcas\

Scripts\

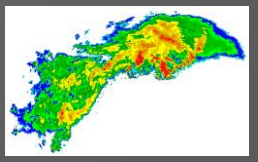
Traffic\

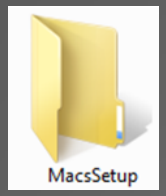
Weather\

.weather = what kind of weather (winds only, winds + convective, etc.)

WxImageFolder = .gif images of convective weather

.xml = displays the weather images and moves them over time within a run





MACS_Setup

Contains the files for display types and various setup panels in MACS

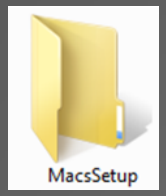
Major display types:

- ATOP, TSD, DSR, STARS
- Scenario Editor
- each has:
  - -planviews
  - -datatag rules
  - -waypoints, etc.

Setup panels:

example 1: DSR_1_dtr

example 2: ATC_DST



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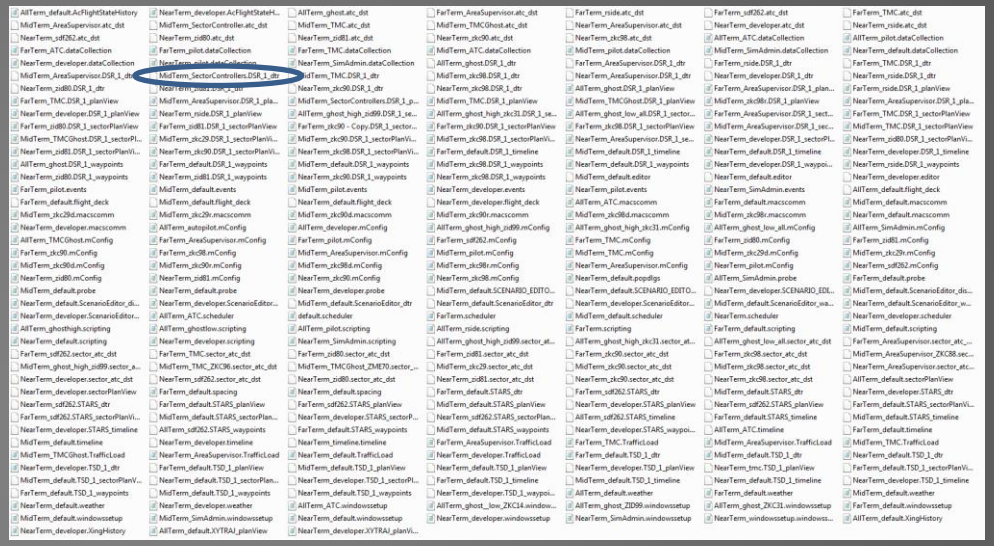
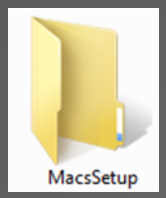
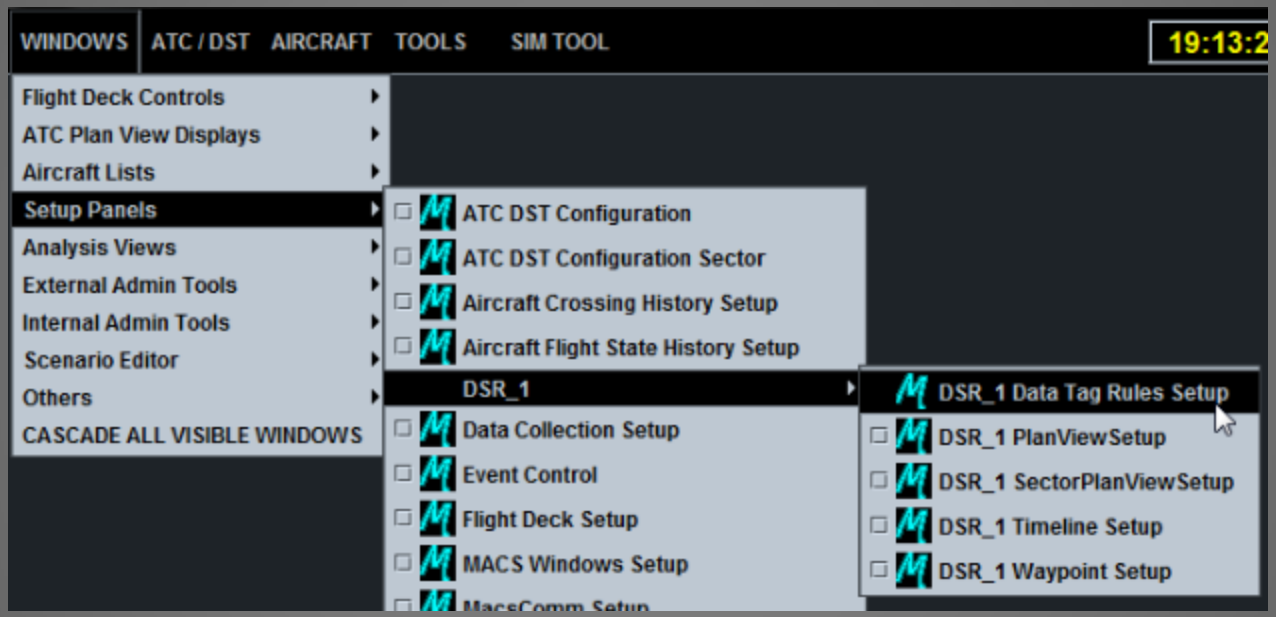


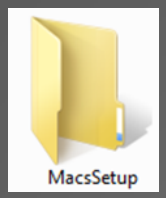


Example 1: DSR_1_dtr

MidTerm_SectorControllers.DSR_1_dtr

Menu Selection





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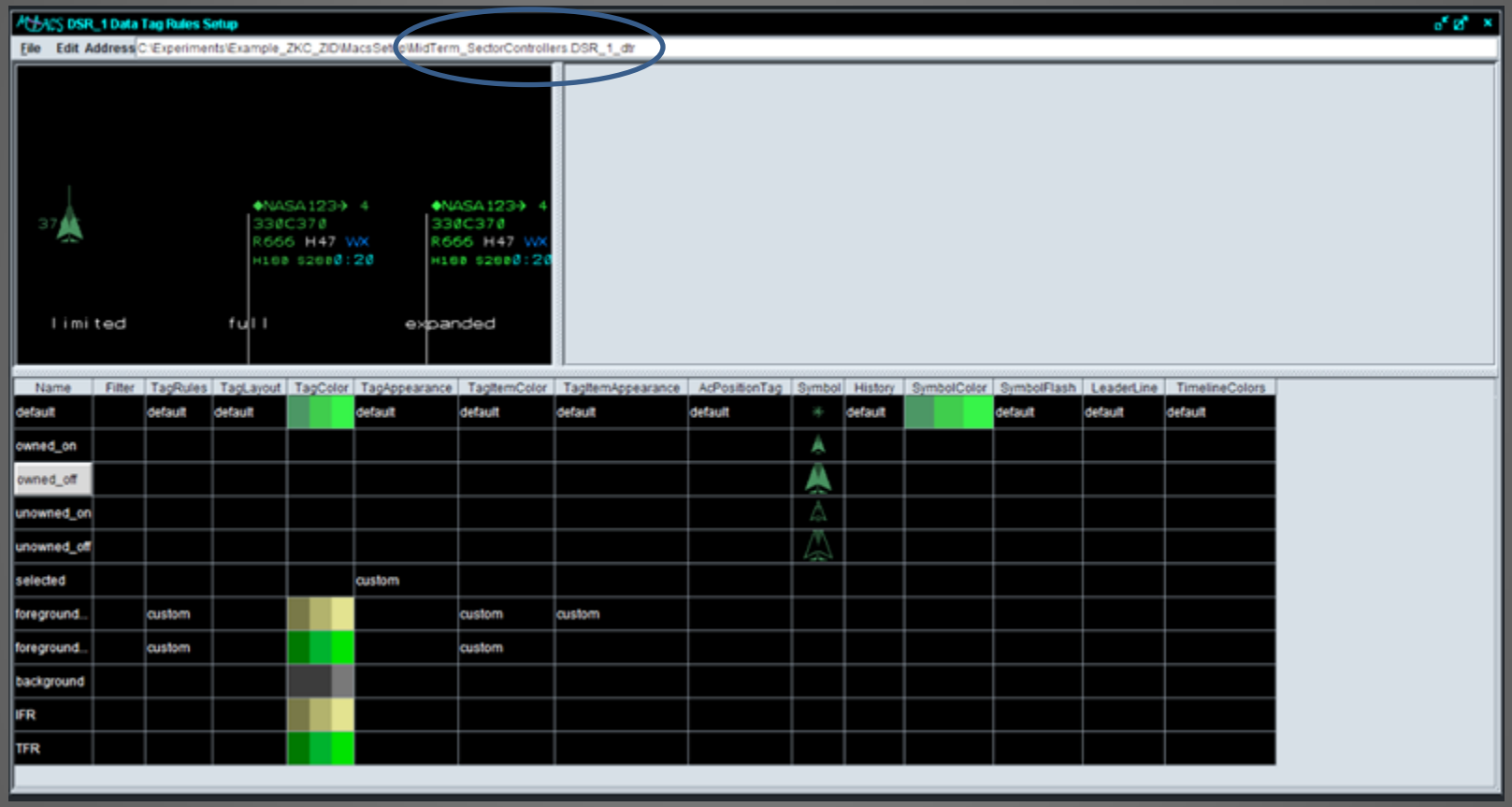
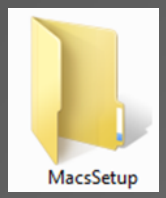
Setup Panel in MACS





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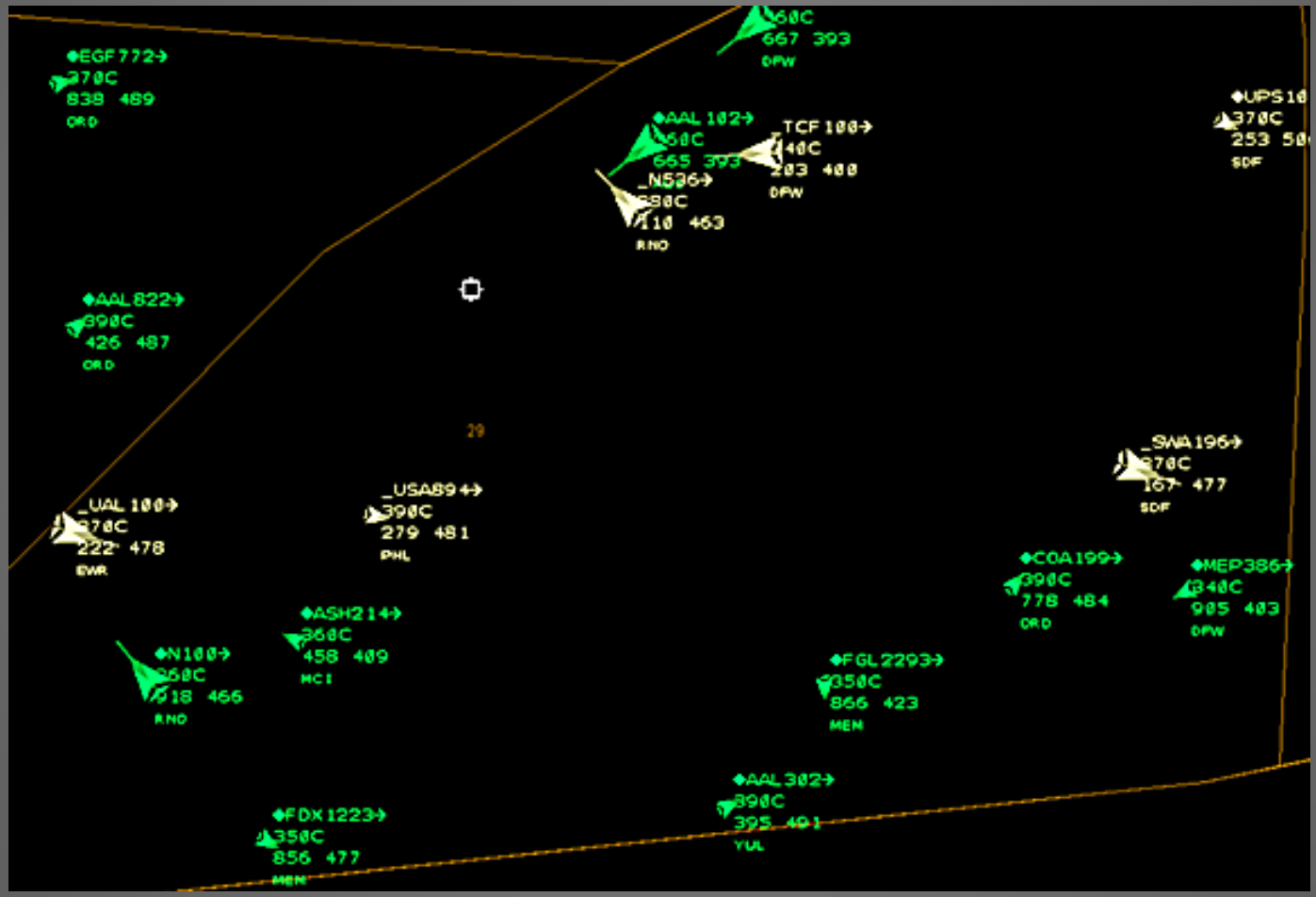
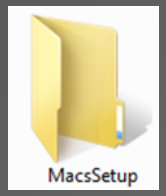
Result





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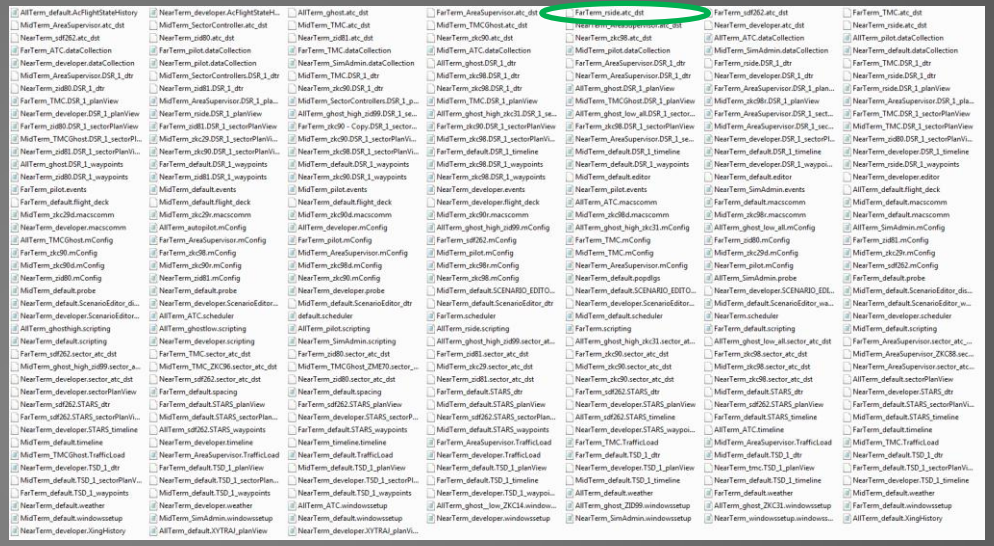
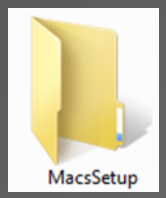
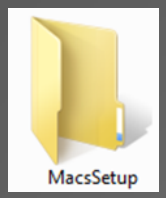




MACS_Setup

FarTerm_rside.atc_dst

Menu Selection



MACS_Setup

FarTerm_rside.atc_dst

Setup Panel in MACS

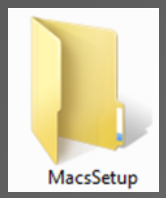
ATC DST Configuration

File Address C:\Experiments\Example_ZKC_ZID\MacsSetup\FarTerm_rside.atc_dst

Airline Filter | Traffic Load | Conflict Probe | Data Link | Sta Freeze | Advisories | Weather Probe | Dynamic Sector | Altitude definitions | Corridors

General Settings | InActive Ac Participtation | Combined sectors | State Source | Traj Filters | Handoff | H/O Autonomous | Conflict Alert

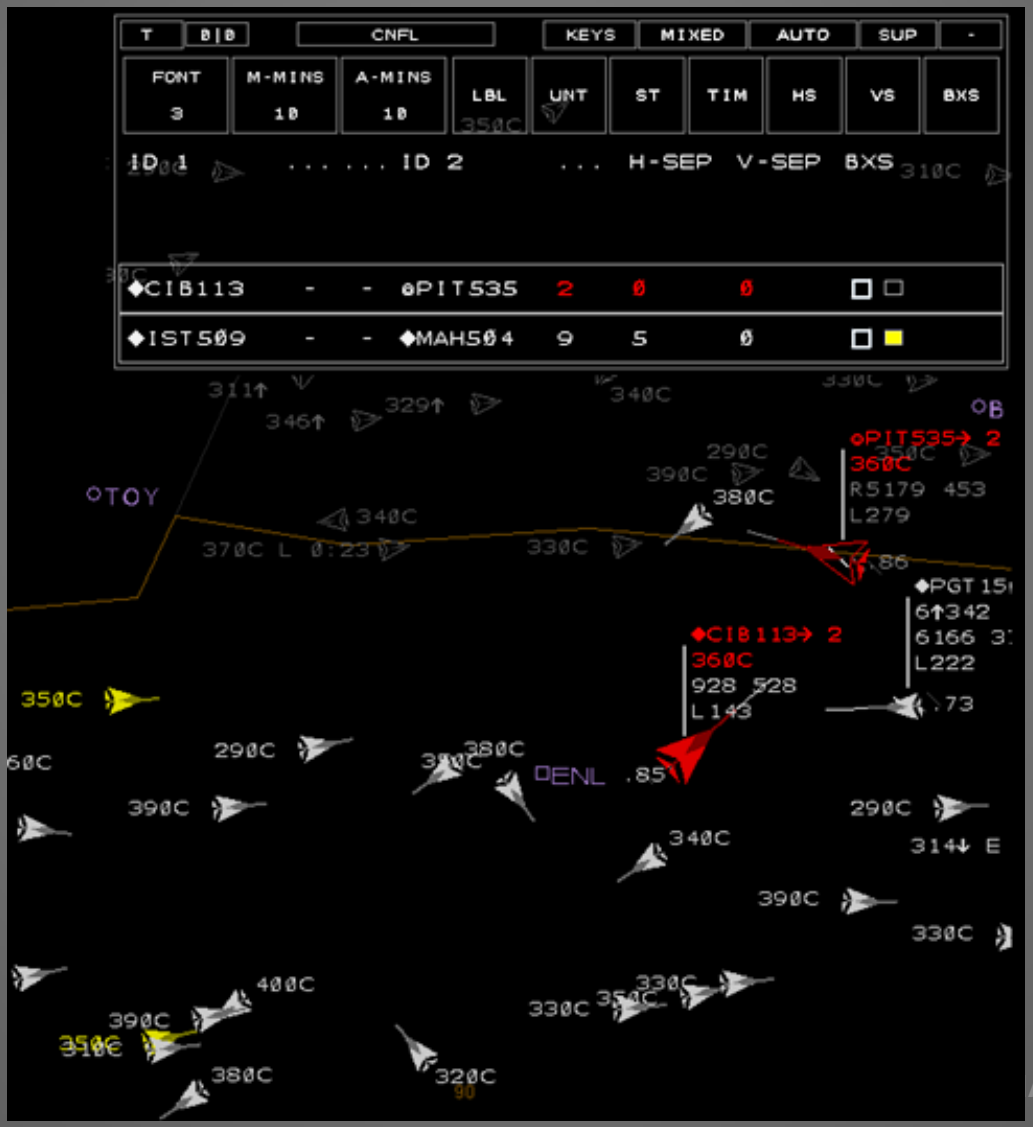
	Managed/Managed	Trial plan/Managed	Managed/Autonomous	Autonomous/Autonomous
Enable conflict probe	☑	☑	☑	☑
External conflict probe (CTAS)	☐	☐	☐	☐
Enable Manual Trial Planning	☑	☑	☑	☑
External Trial Planner (CTAS)	☐	☐	☐	☐
Enable conflict resolution (AAC)	☑	☑	☑	☑
External conflict resolver (CTAS)	☐	☐	☐	☐
Enable TSAFE resolution	☑	☑	☑	☑
Use Auto Resolver for TSAFE	☐	☐	☐	☐
Probe Enabled	☑	☑	☑	☑
Automatic Resolutions	☐	☐	☐	☑
Earliest time for auto-res (sec to LOS)	480	480	480	600
Latest time for auto-res (sec to LOS)	210	210	210	210
AutoResolution Uplink	☐	☐	☐	☑
Use AutoExecution Limits	☐	☐	☐	☑
AutoExec: Maximum Delay (sec)	60	60	60	90
AutoExec: Maximum Heading Change	31.0	31.0	31.0	61.0
AutoExec: Maximum Altitude Change	2200.0	2200.0	2200.0	2200.0
AutoExec: Maximum Speed Change	50.0	50.0	50.0	50.0
AutoResolution Graphics	☑	☑	☑	☐
AutoApprove requests	☐	☐	☐	☐
TSAFE Resolutions	☑	☐	☑	☑
Start time for TSAFE res (sec to LOS)	180	180	180	180
Auto TSAFE Uplink	☐	☐	☐	☑
Uplink time for TSAFE res (sec to LOS)	120	120	120	120
Auto TSAFE Return to Flight Plan	☐	☐	☐	☐
Auto TSAFE Return Owned Only	☐	☑	☐	☐
Show if in my sector or if I own one aircraft	☐	☑	☐	☐

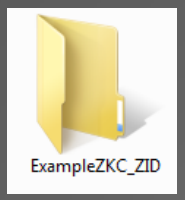


MACS_Setup

FarTerm_rside.atc_dst

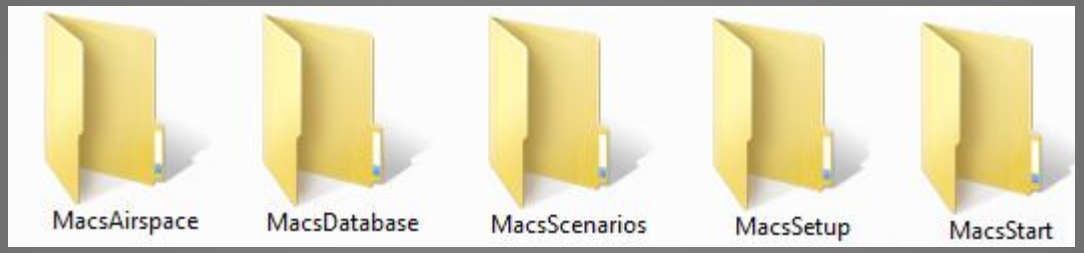
Result



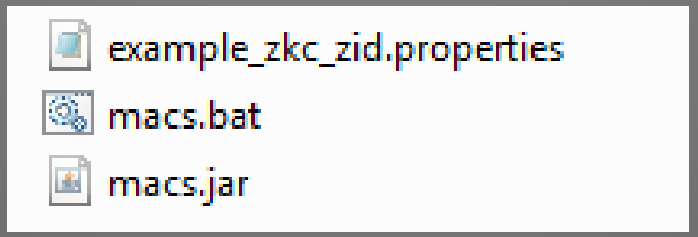


MACS Files and Folders

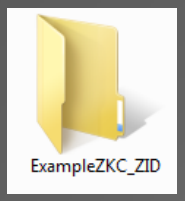
- At the top level within C:\Experiments\Example_ZKC_ZID\
  - 5 major directory folders

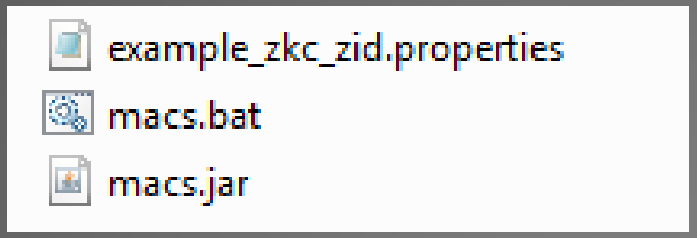


  - High level and central MACS files



MACS Files and Folders



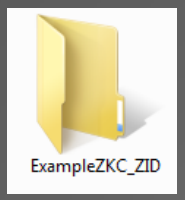


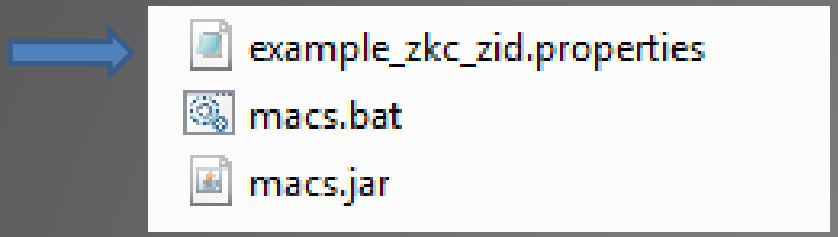
- **.exe**

- **Requires specification of certain parameters**

- **Achieved in our examples folder through layers of .bat files**

MACS Files and Folders





.properties file specifies locations of files/folders
- 1) Airspace directory (primary and secondaries)
- 2) Setup directory

example_zkc_zid.properties - Notepad

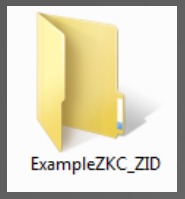
File Edit Format View Help

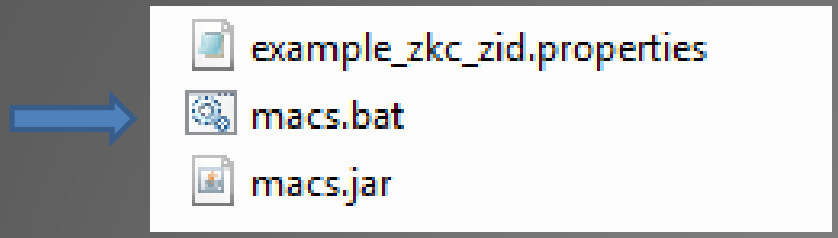
```
# Property file [Partial set of property items (as of 5)]
# c:\Experiments\Example_ZKC_ZID\example_zkc_zid.properties

# Property items that can appear in command line and/or property file
UseMultiScreen = true
adrs = adrs_host.arc.nasa.gov
asdi = false
asdiHost = offline
asdiId = onlyYouKnow
asdiMode = false
asdiPassword = onlyYouKnow
asdiPort = 2010
audioText = false
cFmsForceModRteDispatch = false
cFmsMode = false
cFmsPort = 7803
cdti = false
cdtiHost = offline
config = view
cruise = false
crzAltTrajMode = false
geometry = maximized
master = default.mConfig
```

```
metronEnabled = false
noGUI = false
numDsrDisplays = 1
numTsdDisplays = 1
operator = Analyst
password = onlyYouKnow
sessionMode = default
smartSkies = false
user = guest
# Property items that appear only in property file
AirportLetterCodesDirectory = custom/
AirportLetterCodesFilename = airport_letter_codes
AirportsDirectory = ../NAS_wide/
AirportsFilename = airports
AirspaceDirectory = C:/Experiments/Example_ZKC_ZID/MacsAirspace/
CenterBoundariesDirectory = navdb/
```

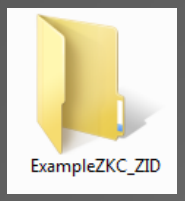
MACS Files and Folders

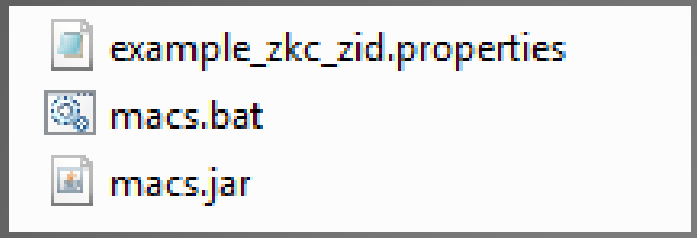




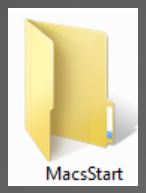
- cd "C:\Experiments\Example_ZKC_ZID"
- java
- Xms2048m - Xmx2048m
- XX:+UseConcMarkSweepGC
- classpath macs.jar
- MacsDatabase\JavaExtensions\log4j-1.2.13.jar
- MacsDatabase\JavaExtensions\jython.jar
- Macs

MACS Files and Folders





- properties=example_zkc_zid.properties
- adrs=%1.arc.nasa.gov
- operator=%2
- master=%3
- %1, %2, %3, etc. are place holder variables that are passed arguments from other .bat files



MACS_Start

For launching different kinds of MACS stations under different pre-set configurations

-Admin, ATC, Pilot

- ATC

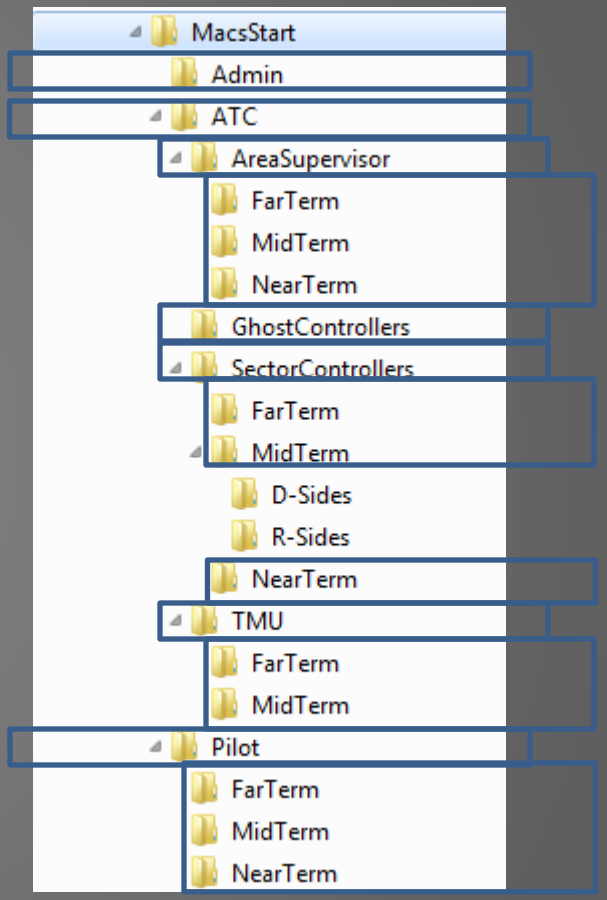
  - Area Supervisor

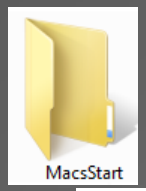
  - Ghost Controllers

  - Sector Controllers

  - TMU

- FarTerm, MidTerm, NearTerm





MACS_Start

EXAMPLE_ZKC_ZID

Admin\
- AllTerm_Developer.bat
- AllTerm_SimManager.bat

AreaSupervisor\
FarTerm\, MidTerm\, NearTerm\
- AreaSupervisor.bat
- AreaSupervisor.bat
- AreaSupervisor.bat

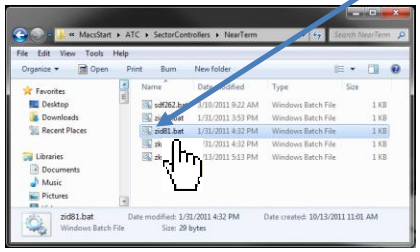
GhostControllers\
- ghost_high_zid99.bat
- ghost_high_zkc31.bat
- ghost_low_all.bat

SectorControllers\
FarTerm\, MidTerm\, NearTerm\
- sdf262.bat
- zid80.bat
- zid81.bat
- zkc90.bat
- zkc98.bat

- sdf262.bat
- zid80.bat
- zid81.bat
- zkc90.bat
- zkc98.bat

D-Sides\
- ZKC29D.bat
- ZKC90D.bat
- ZKC98D.bat

R-Sides\
- sdf262.bat
- ZKC29R.bat
- ZKC90R.bat
- ZKC98R.bat



TMU\
- AllTerm_TMCGhost.bat

FarTerm\, MidTerm\
- TMC.bat
- TMC.bat

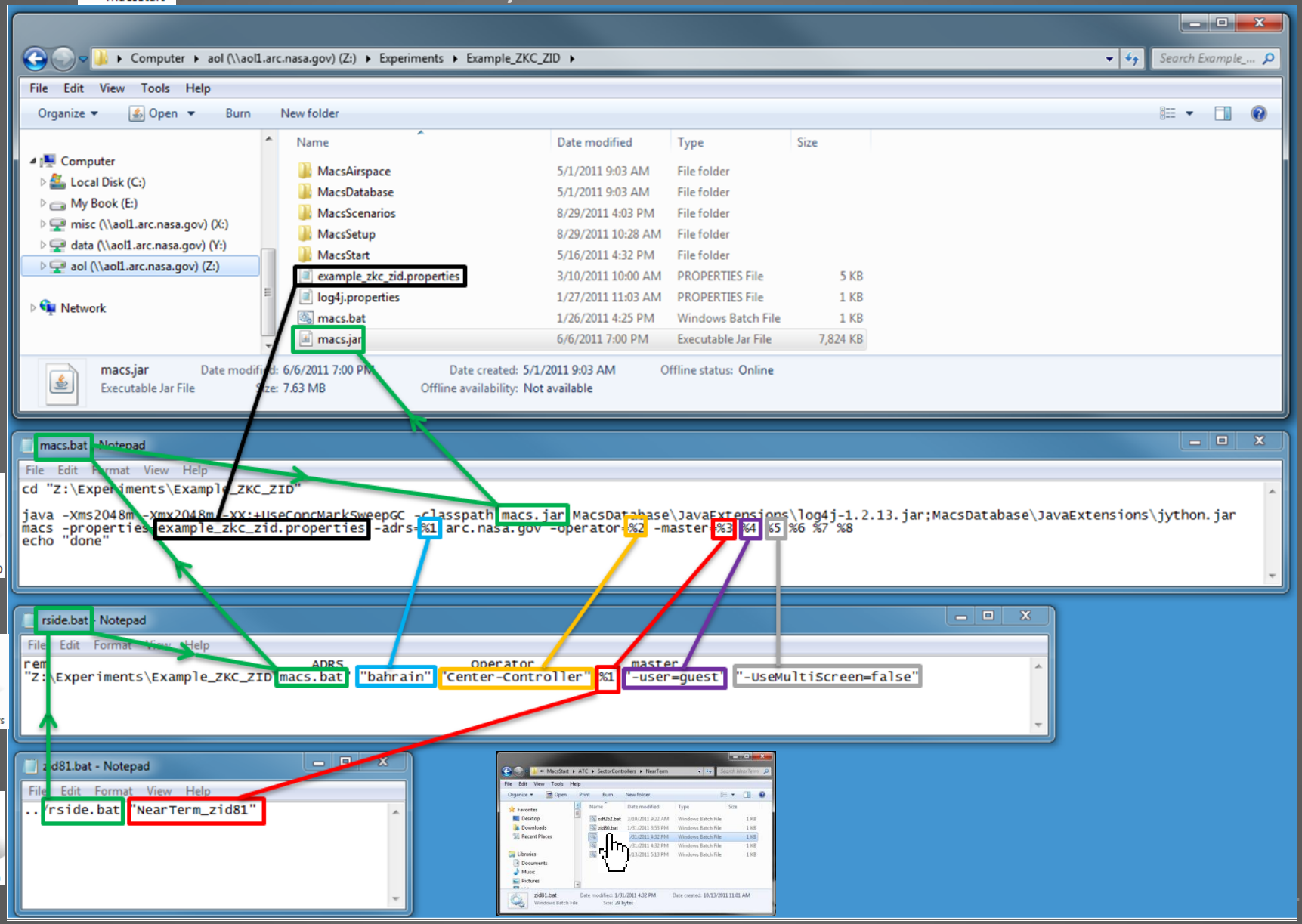
Pilot\
FarTerm\,
- FarTerm_pilot_ghost.bat
- FarTerm_pilot_sdf262.bat
- FarTerm_pilot_zid80.bat
- FarTerm_pilot_zid81.bat
- FarTerm_pilot_zkc90.bat
- FarTerm_pilot_zkc98.bat

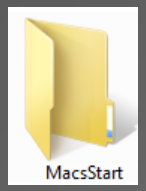
MidTerm\,
- MidTerm_pilot_ghost.bat
- MidTerm_pilot_sdf262.bat
- MidTerm_pilot_zid80.bat
- MidTerm_pilot_zid81.bat
- MidTerm_pilot_zkc29.bat
- MidTerm_pilot_zkc90.bat
- MidTerm_pilot_zkc98.bat

NearTerm\
- NearTerm_pilot_ghost.bat
- NearTerm_pilot_sdf262.bat
- NearTerm_pilot_zid80.bat
- NearTerm_pilot_zid81.bat
- NearTerm_pilot_zkc90.bat
- NearTerm_pilot_zkc98.bat

MACS_Start

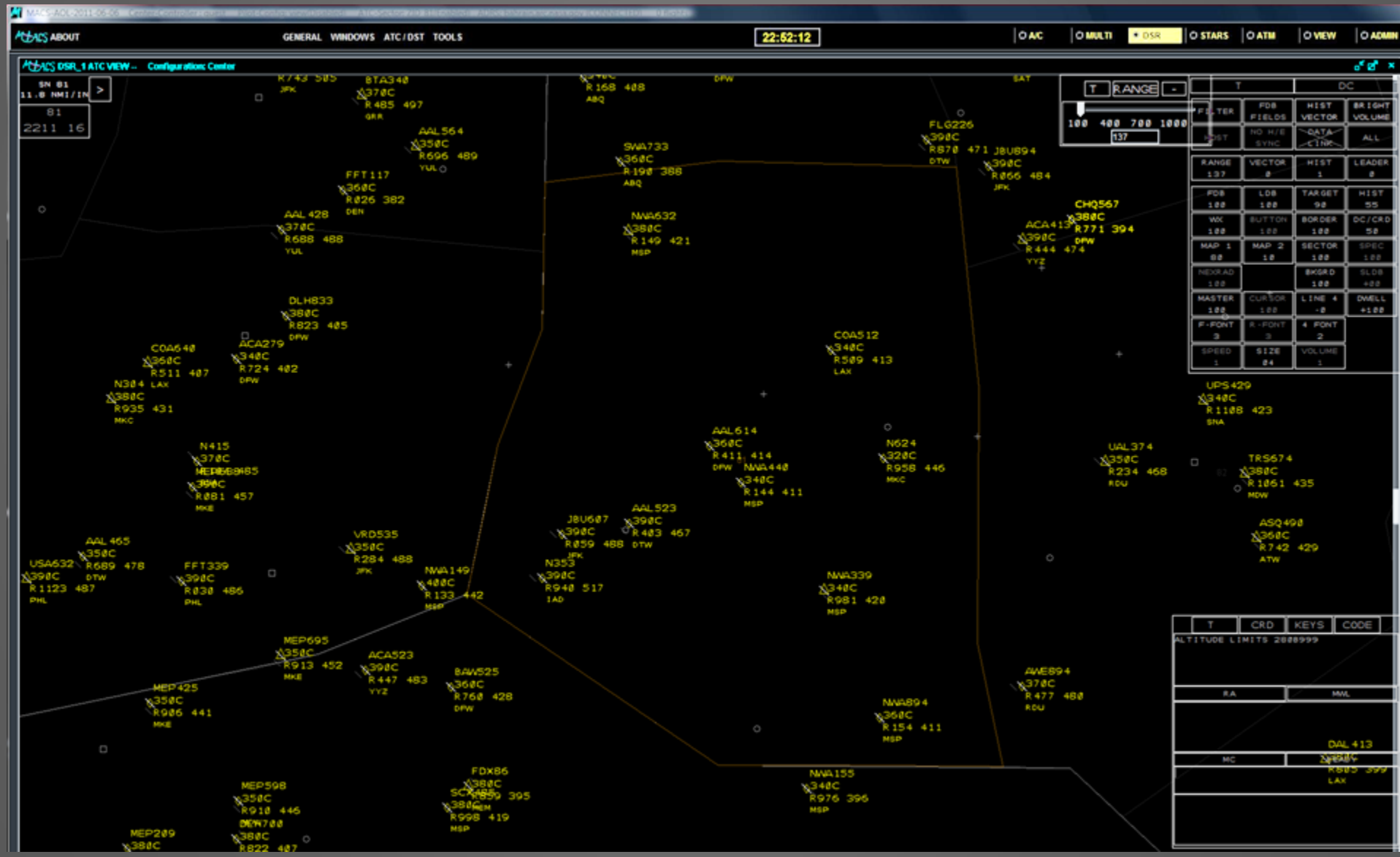
Layered Batch Files

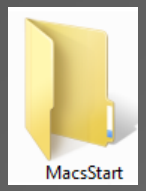




MACS_Start

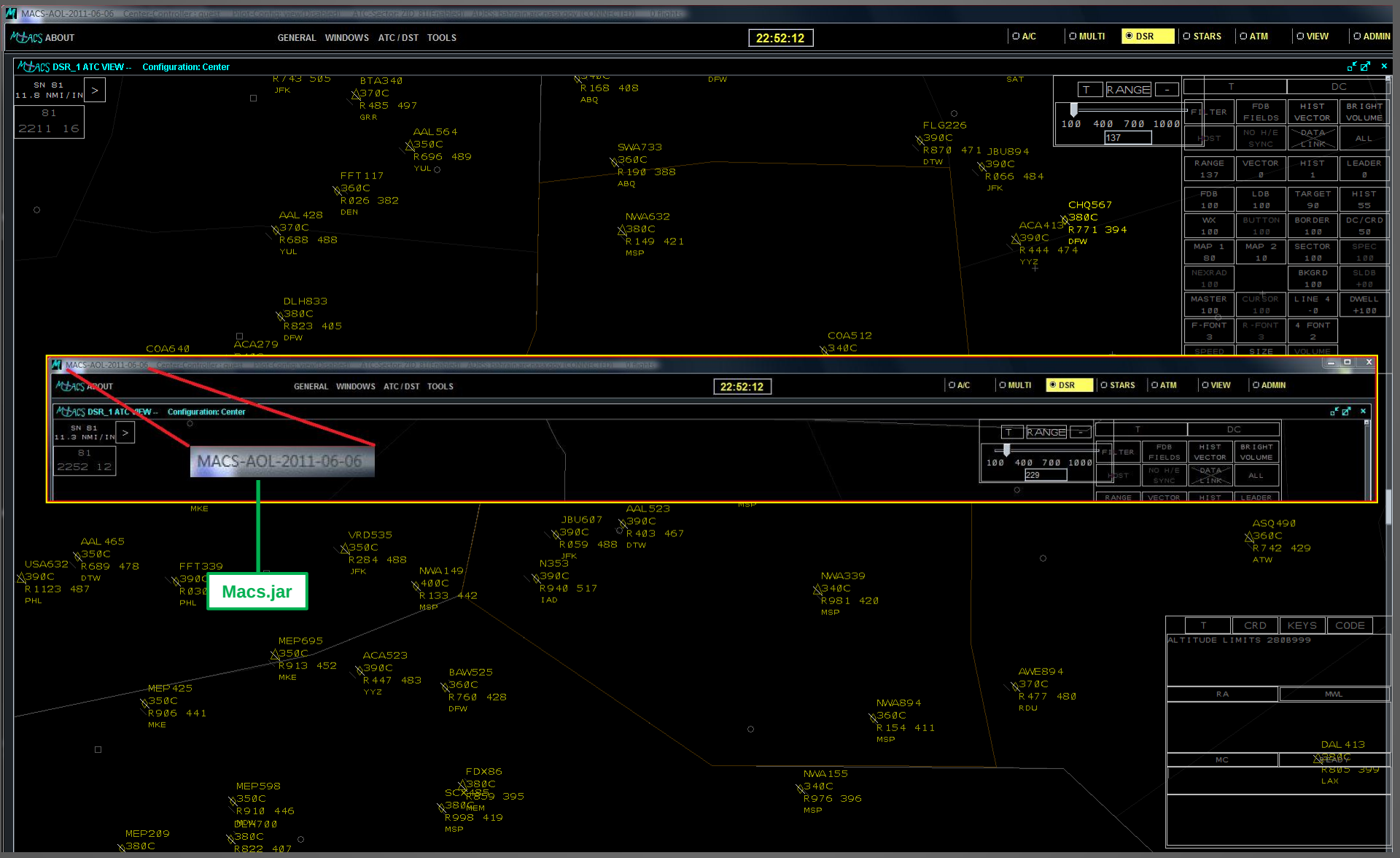
End Result: from the MACS Batch Files

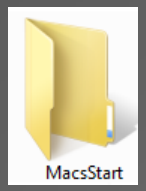




MACS_Start

End Result: Macs (green)

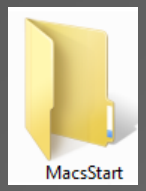




MACS_Start

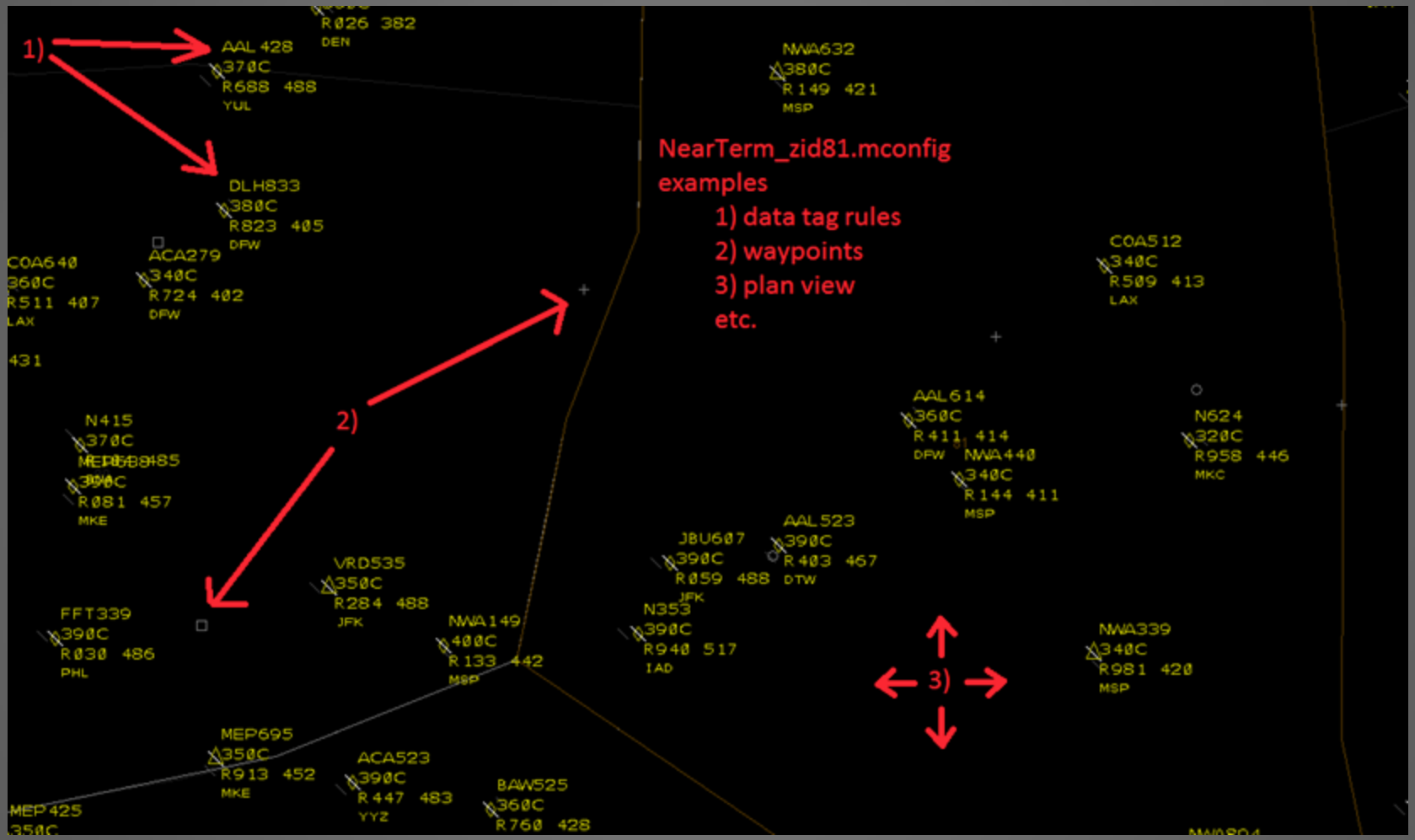
End Result:

Operator Mode (orange), User (purple), Master Config (red) and ADRS (blue)

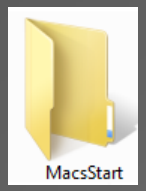


MACS_Start

End Result: Master Config (red)



MultiScreen



MACS_Start

End Result:

MultiScreen (gray) and .properties (black/white)

.properties examples

1) MacsAirspace
2) Sector Boundaries
etc.

.properties

Questions?
Christopher.D.Cabrall@nasa.gov

- System requirements
- Installation
  - Stand-alone application on a single computer
  - Networked simulation platform across multiple computers
    - ADRS
- MACS files and folders overview
  - Organization
  - Principle files (some of the major players)
- How to start and run MACS
  - .bat file shortcuts