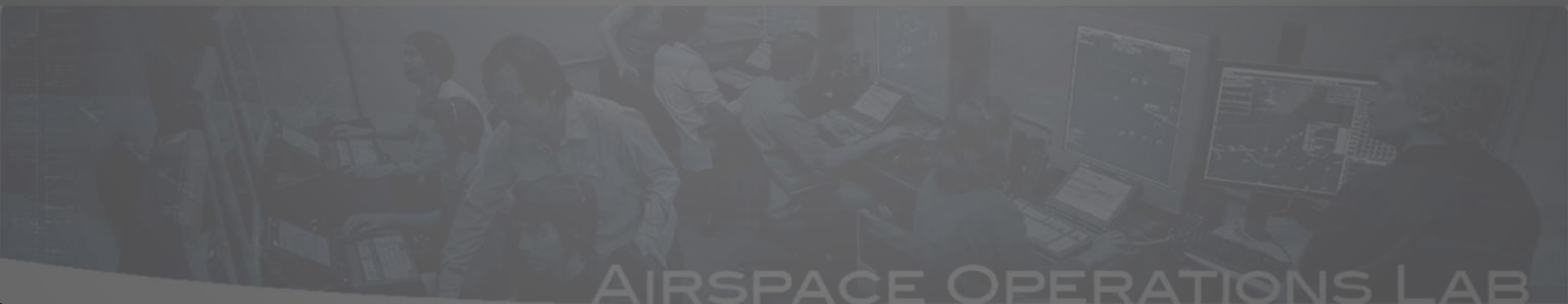
# Getting Started with MACS: Installation, directory overview, launching

Chris Cabrall



# Installation (unzip and copy)

On your laptop:

1) Put in the CD
2) right-click on “MACs_Install_Stand_Alone.zip”; select “Extract All…”
3) Select destination folder, i.e. Desktop or a new folder on your Desktop

**4) Wait 4 to 5 minutes …**

5) Create a new folder called “Experiments” on the top level of your local hard drive, e.g. C:\Experiments\

**When the unzip is complete…**

1) Cut and paste the Example folders:
   “Example_ZFW”,
   “Example_ZKC_ZID”,
   “Example_ZLA”,
   “Example_ZOB”

*From within “MACs_Install_Stand_Alone” (which is now unzipped on your desktop):*

*into:*

C:\Experiments\

*result:*

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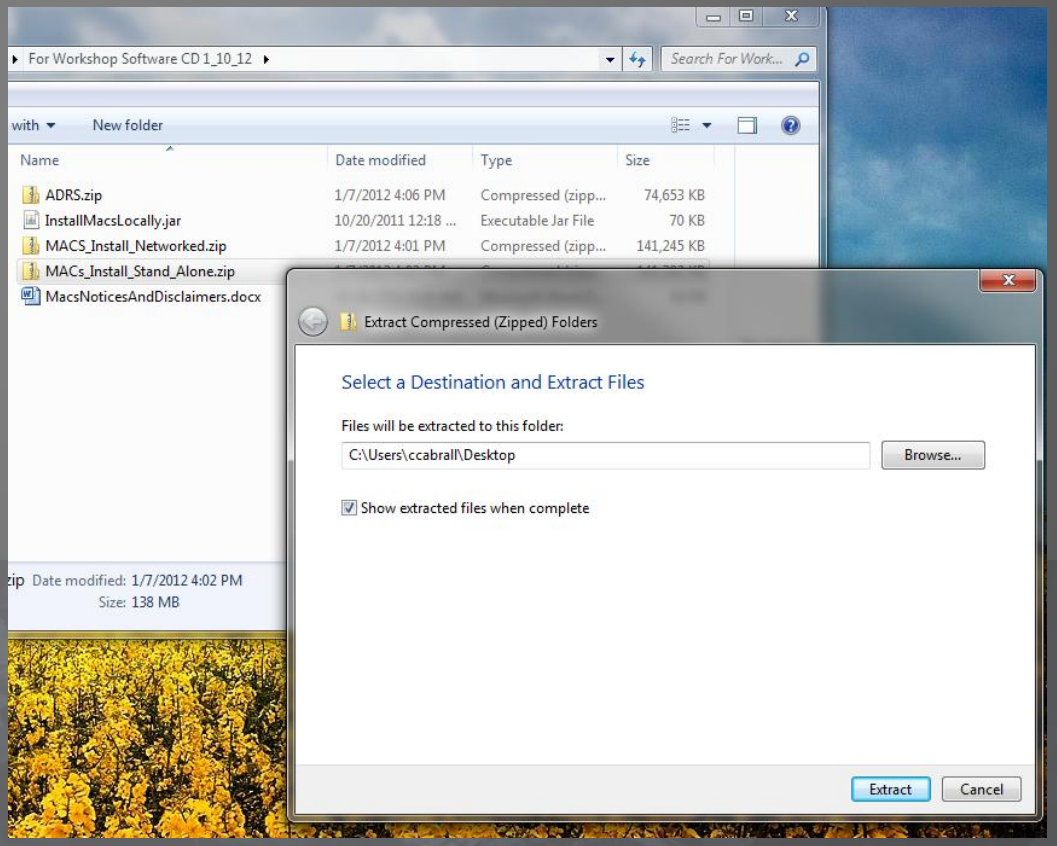
C:\Experiments\Example_ZKC_ZID\

C:\Experiments\Example_ZLA\

C:\Experiments\Example_ZOB\




**2) You can then delete the empty “MACS_Install_Stand_Alone” folder**

# 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

MACS Workshop, 1/10 - 1/11, 2012

# 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\

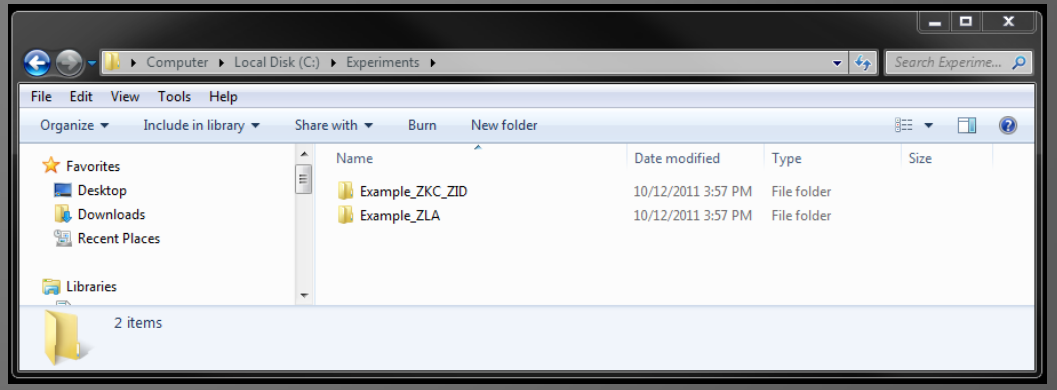
*into:*

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\

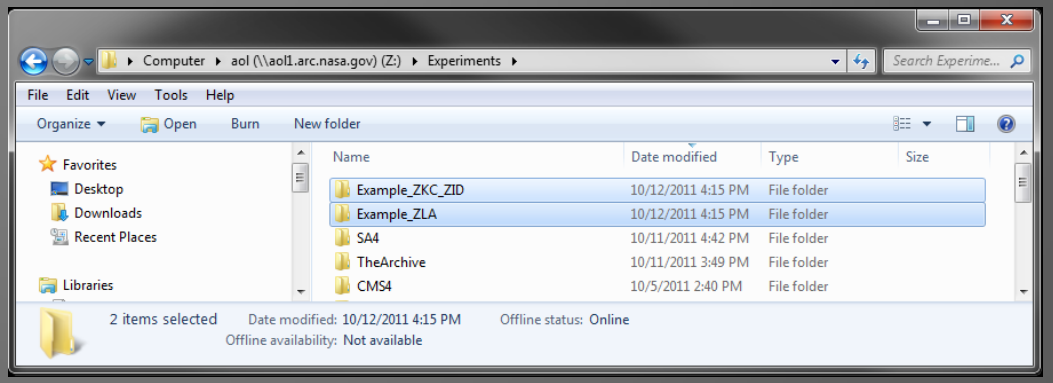
*into:*

Z:\Experiments\

*result:*

Z:\Experiments\Example_ZKC_ZID\

Z:\Experiments\Example_ZLA\

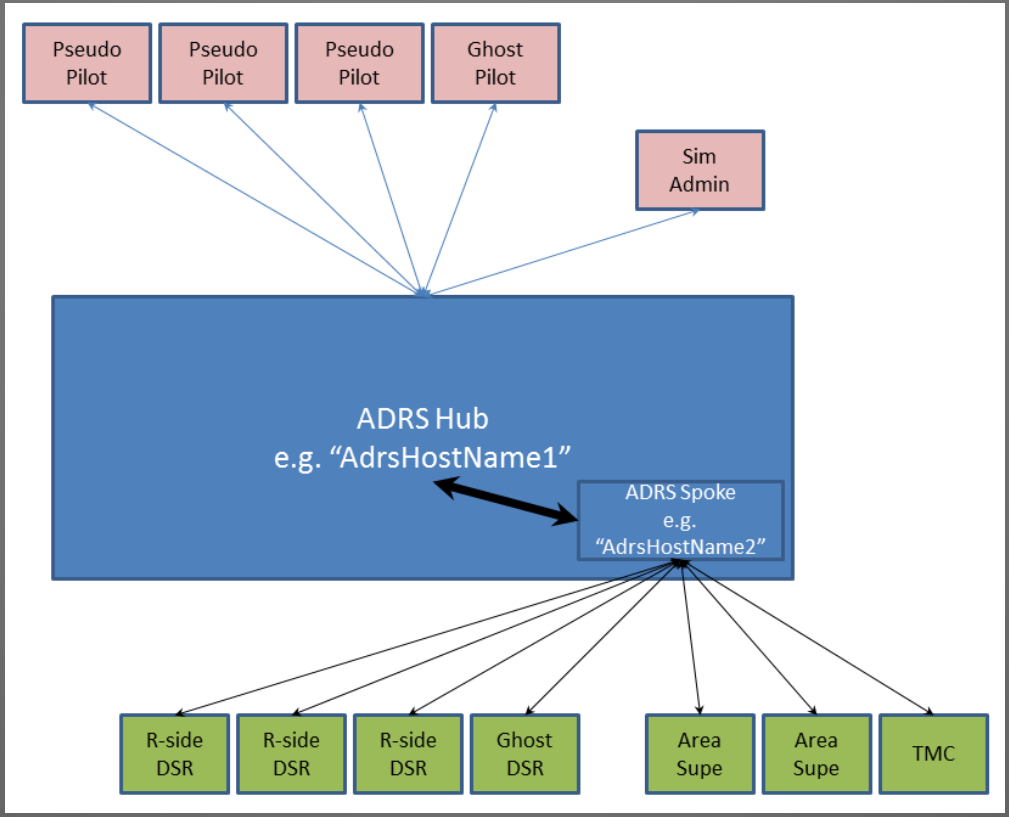


# Installation (networked)

- 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



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*result:*

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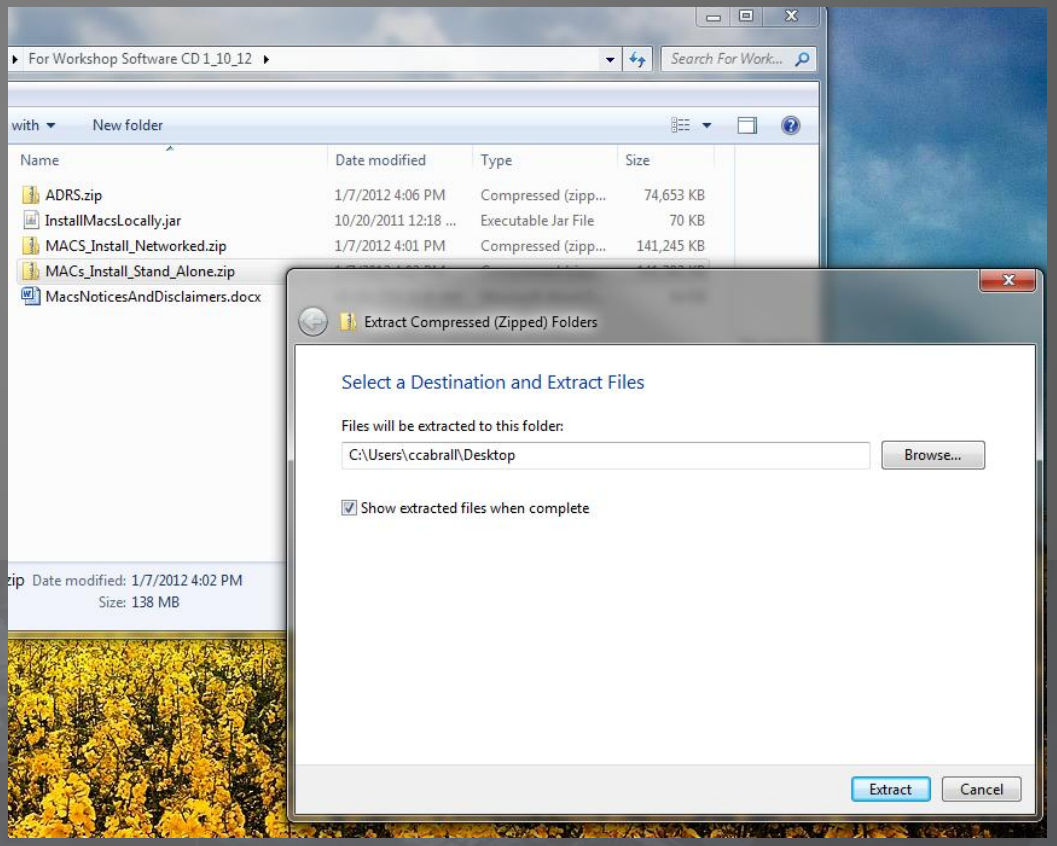


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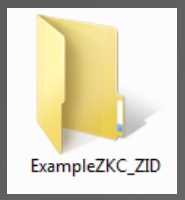
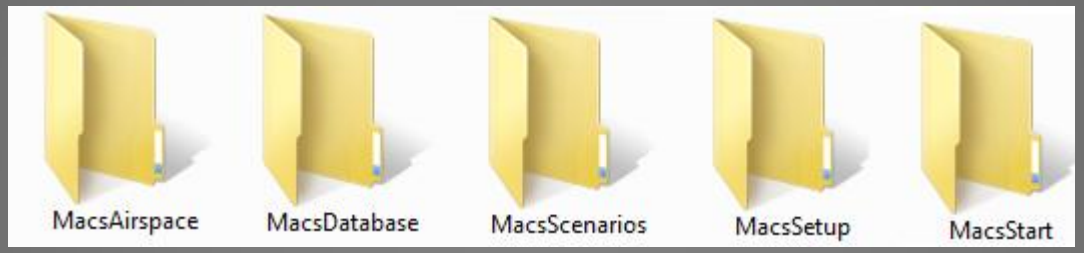
AIRSPACE OPERATIONS LAB

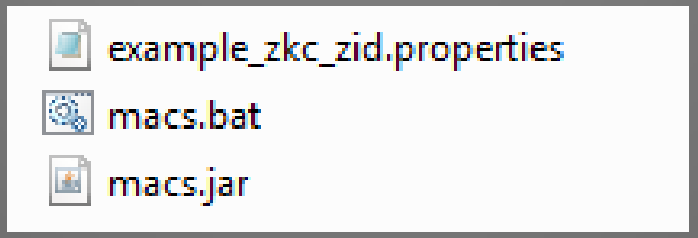


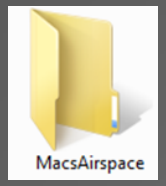

# MACS Files and Folders

- 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.

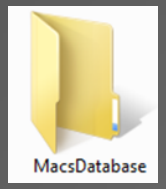
Organized into:

-NAS_Wide (self-explanatory)

-Airspaces

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

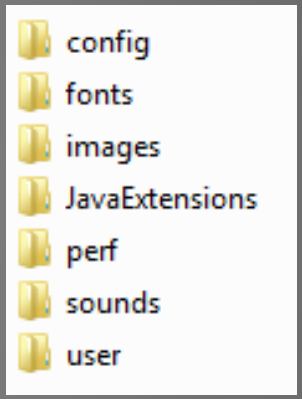
- NAVDB\
- CUSTOM\
- VIDEO MAPS\

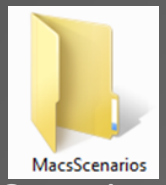



# MACS_Database

Contains pilot configuration and various MACS “system” files

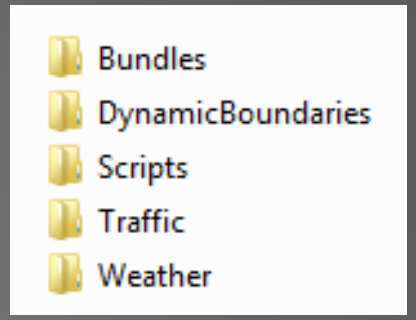
- Config\ – pilot configuration files for determining which
  planes a pilot station will have ownership of/access to (e.g. zkc90)
- Fonts\, Images\, Sounds\ – self explanatory
- JavaExtensions\– for add-on functionality, e.g. speech synthesis , some scripting, etc.
- Perf\ – aircraft performance specifications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





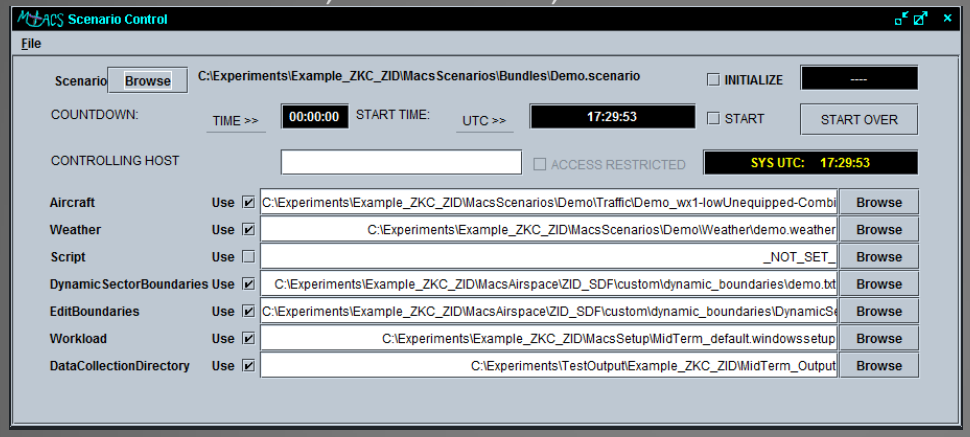

# MACS_Scenarios

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




Bundles\

-run1.scenario, run2.scenario, etc.




Dynamic Boundaries\

-EditOptions\, ScriptedBoundaries\, rcas\

Scripts\

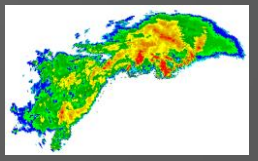
Traffic\

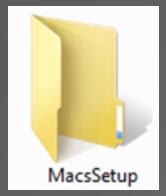
Weather\

.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

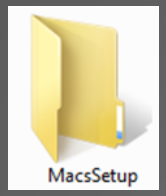
Major display types:

- 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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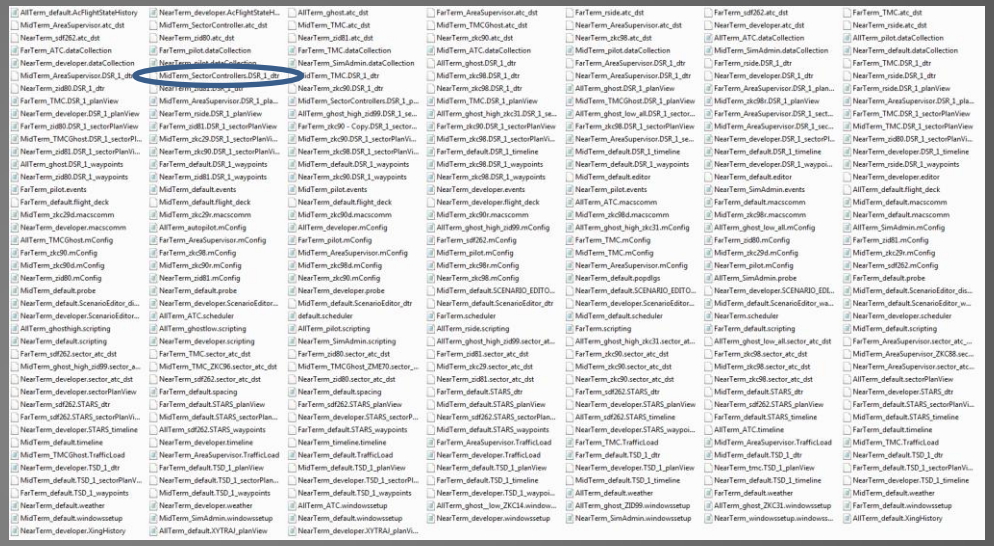
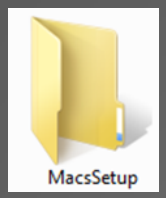
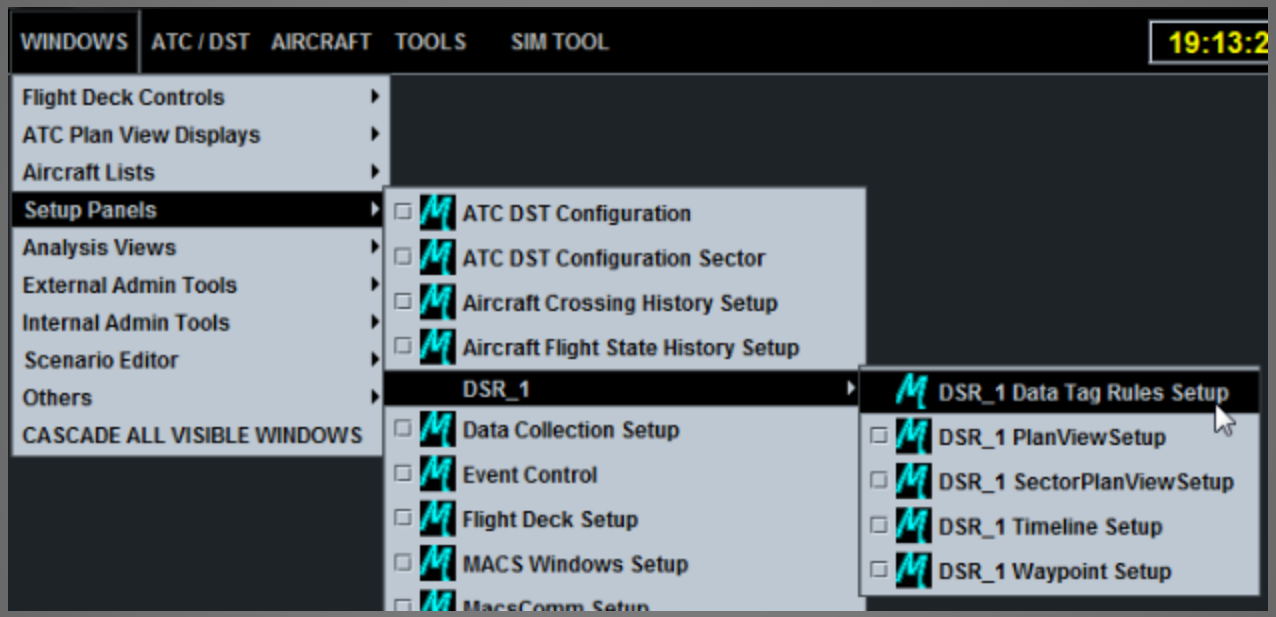


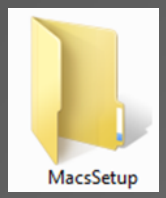



# Example 1: DSR_1_dtr

MidTerm_SectorControllers.DSR_1_dtr

Menu Selection



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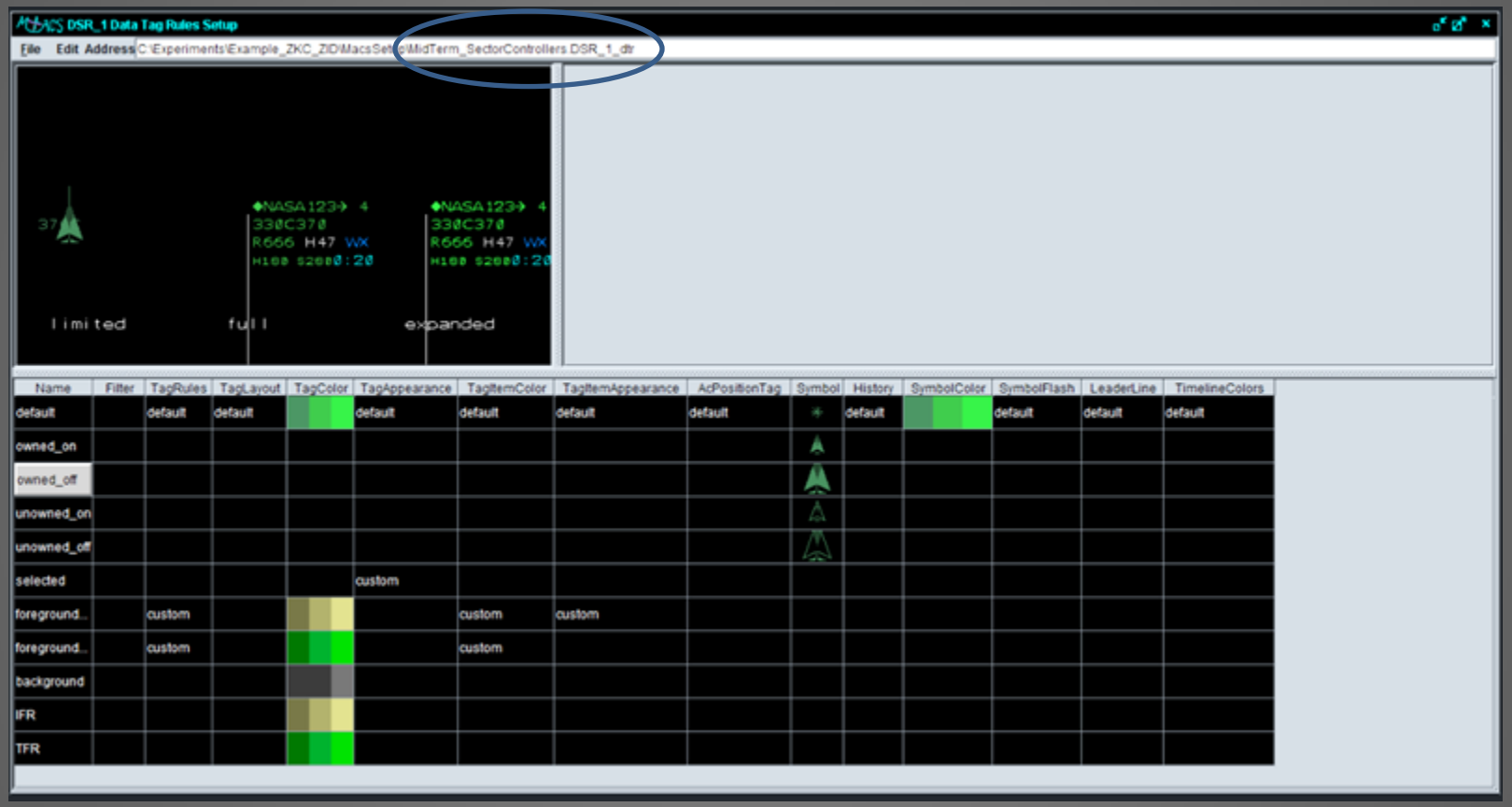
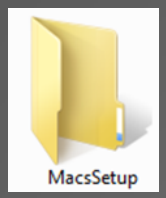
## MidTerm_SectorControllers.DSR_1_dtr

Setup Panel in MACS



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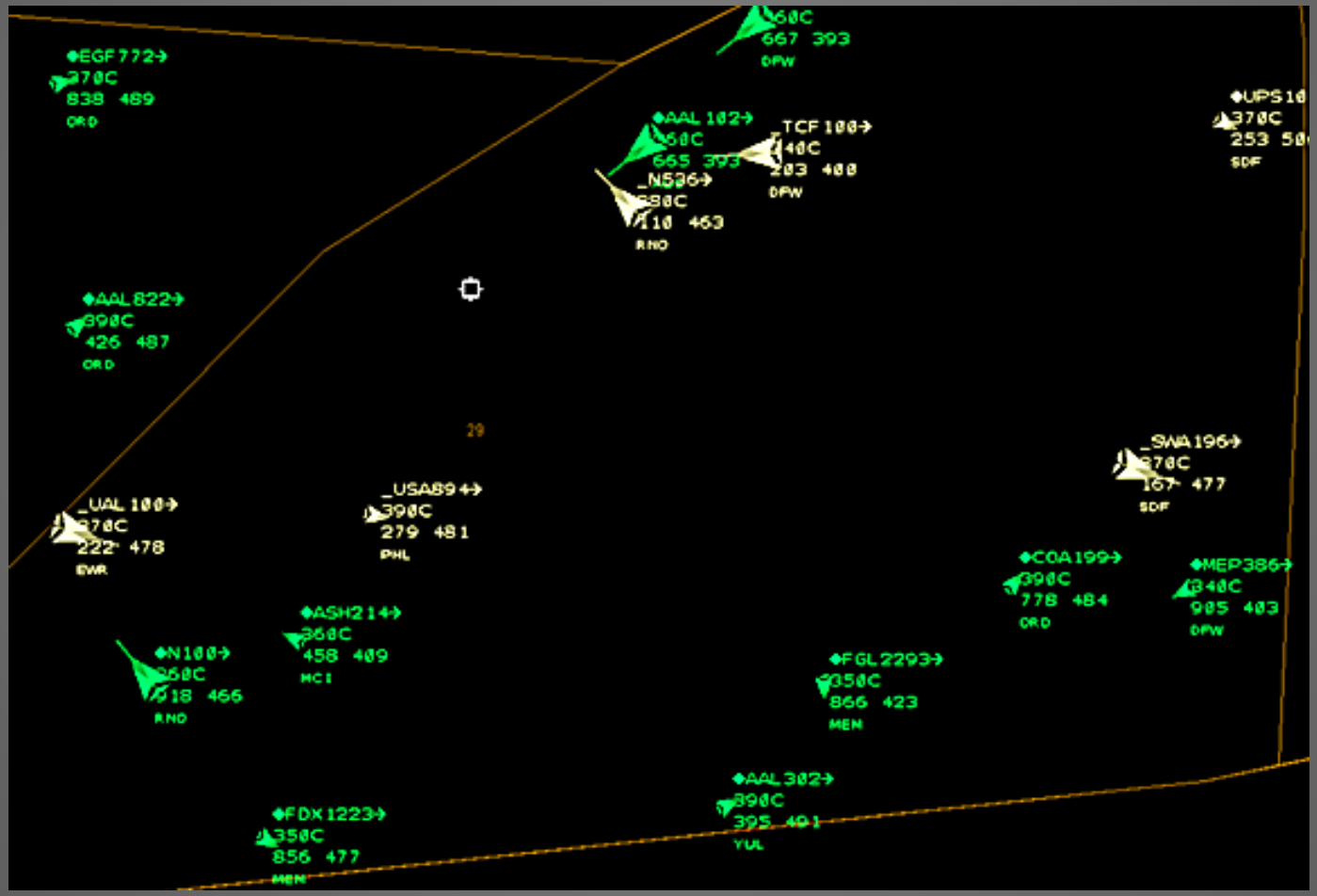
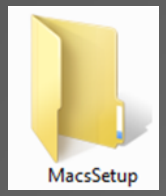
MidTerm_SectorControllers.DSR_1_dtr

Result



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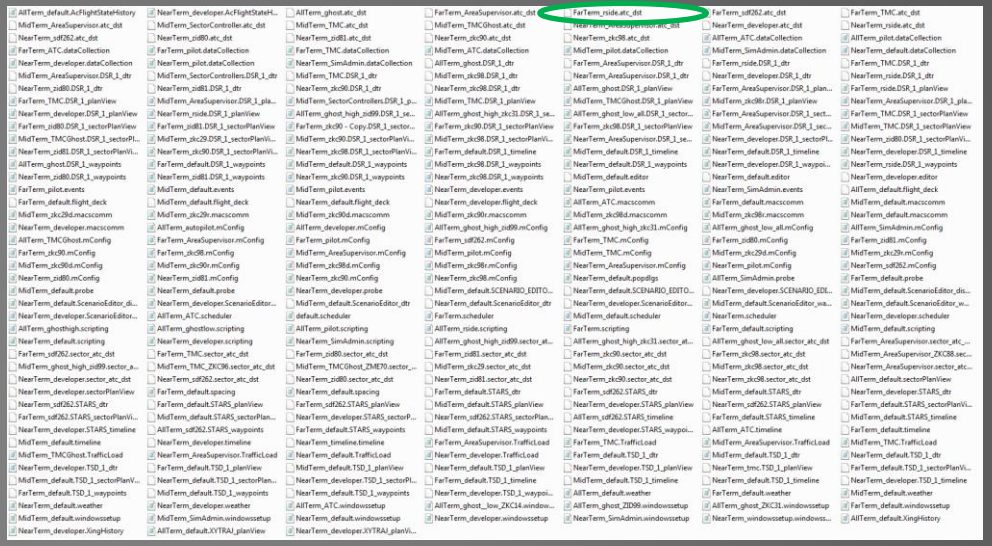
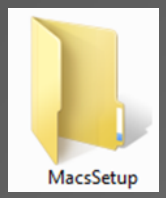
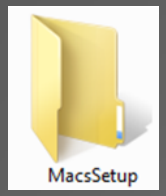





# MACS_Setup

## FarTerm_rside.atc_dst

### Menu Selection




# MACS_Setup

## FarTerm_rside.atc_dst

Setup Panel in MACS

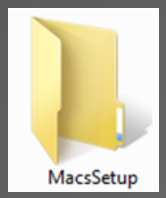
ATC DST Configuration

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 | ☐ | ☑ | ☐ | ☐ |

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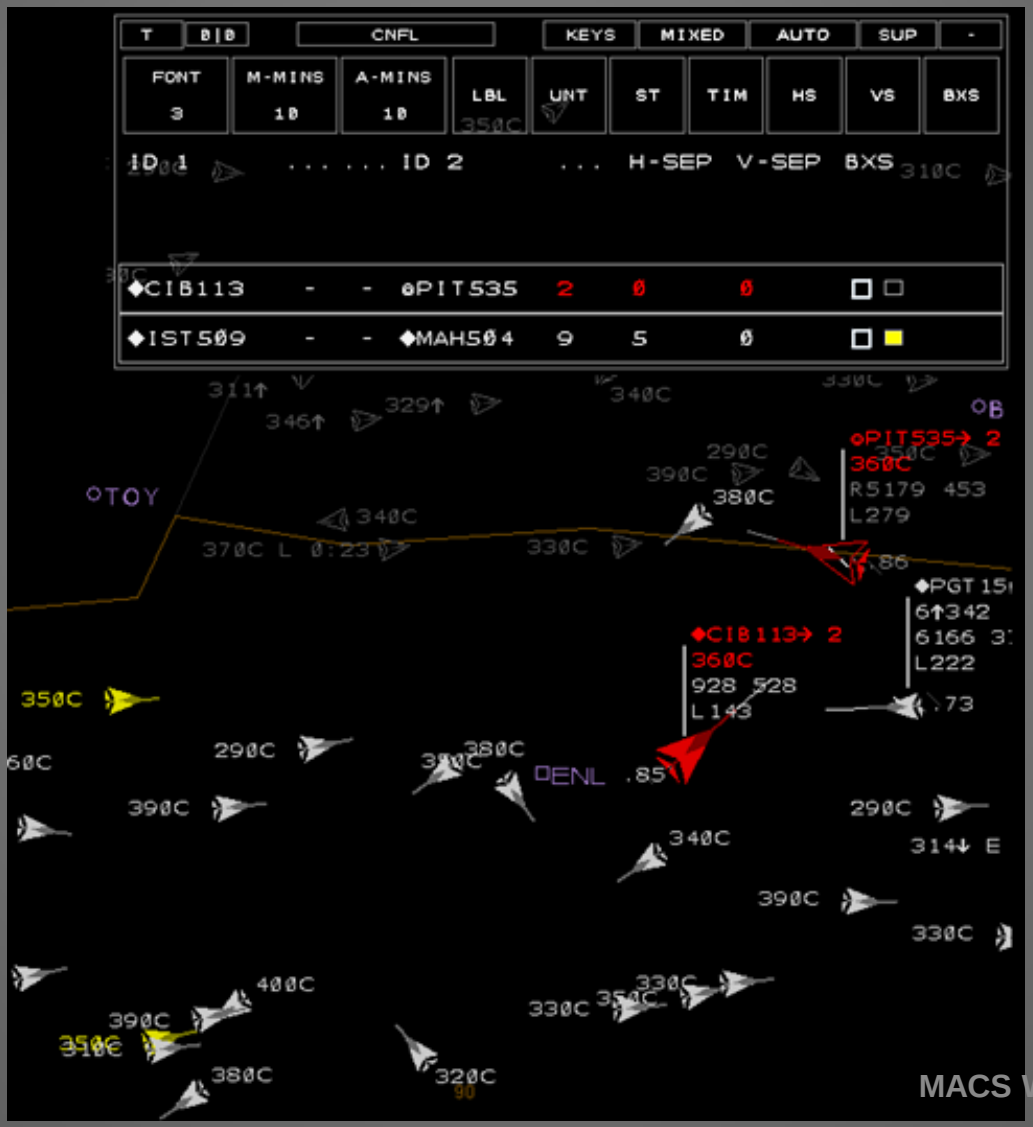
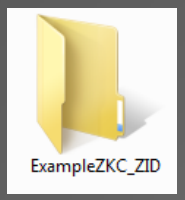
## FarTerm_rside.atc_dst

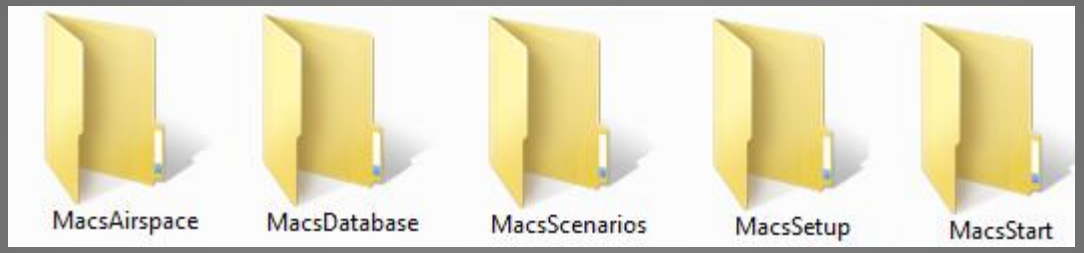
### Result



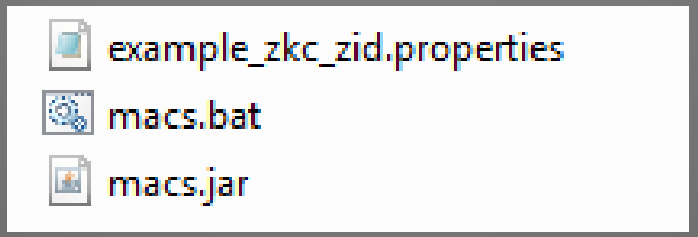



# MACS Files and Folders

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




  - High level and central MACS files



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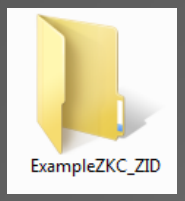
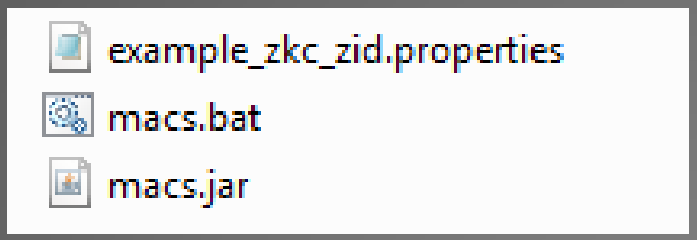
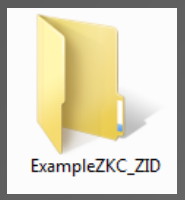
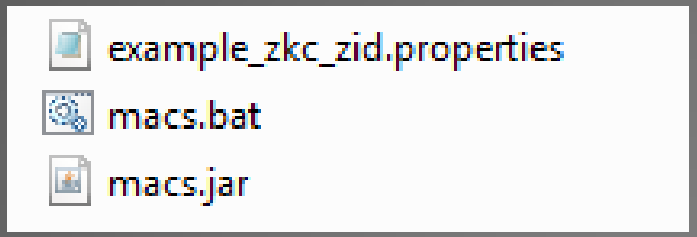



- **.exe**
- **Requires specification of certain parameters**
- **Achieved in our examples folder through layers of .bat files**

# MACS Files and Folders




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

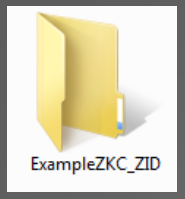
example_zkc_zid.properties - Notepad

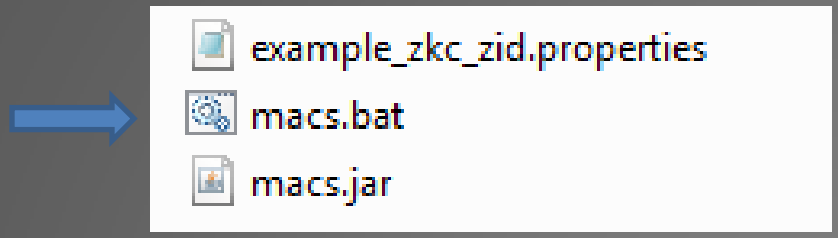
File Edit Format View Help

```
# 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/
```

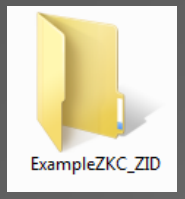
# MACS Files and Folders

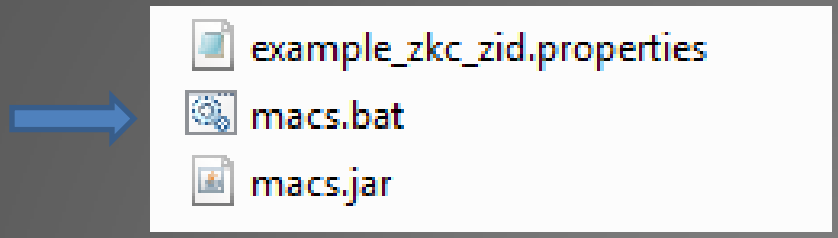


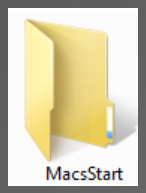

- cd "C:\Experiments\Example_ZKC_ZID"
- java
- Xms2048m - Xmx2048m
- XX:+UseConcMarkSweepGC
- classpath macs.jar
- MacsDatabase\JavaExtensions\log4j-1.2.13.jar
- MacsDatabase\JavaExtensions\jython.jar
- Macs

# 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

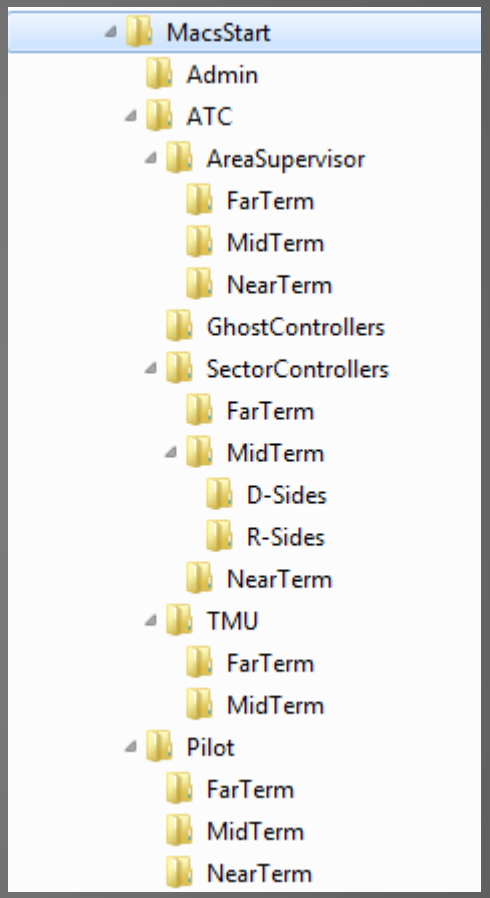
  - Area Supervisor

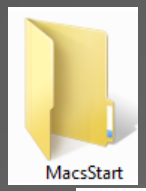
  - Ghost Controllers

  - 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

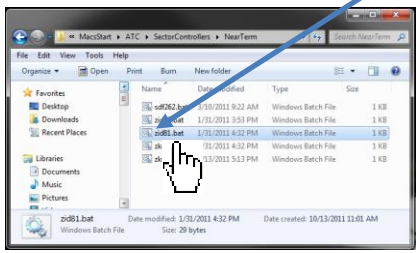
- sdf262.bat
- zid80.bat
- zid81.bat
- zkc90.bat
- zkc98.bat

**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\,

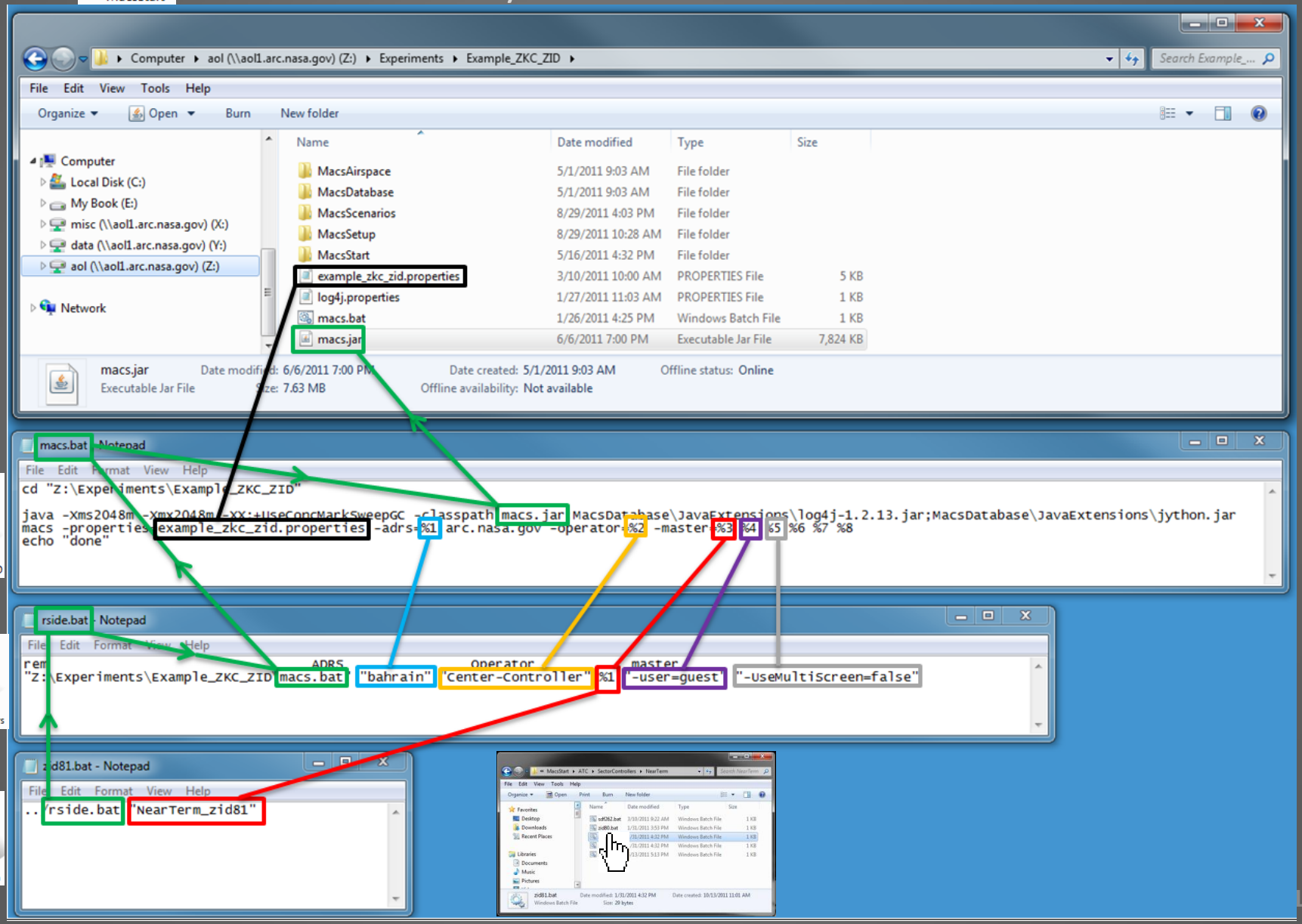
- MidTerm_pilot_ghost.bat
- MidTerm_pilot_sdf262.bat
- MidTerm_pilot_zid80.bat
- MidTerm_pilot_zid81.bat
- MidTerm_pilot_zkc29.bat
- MidTerm_pilot_zkc90.bat
- MidTerm_pilot_zkc98.bat

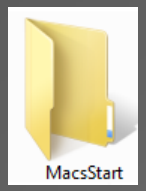
NearTerm\

- 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

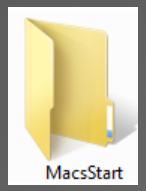
## Layered Batch Files





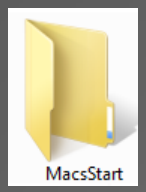

# MACS_Start

## End Result: from the MACS Batch Files




# MACS_Start

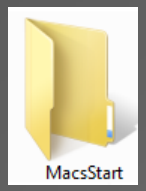
## End Result: Macs (green)




# MACS_Start

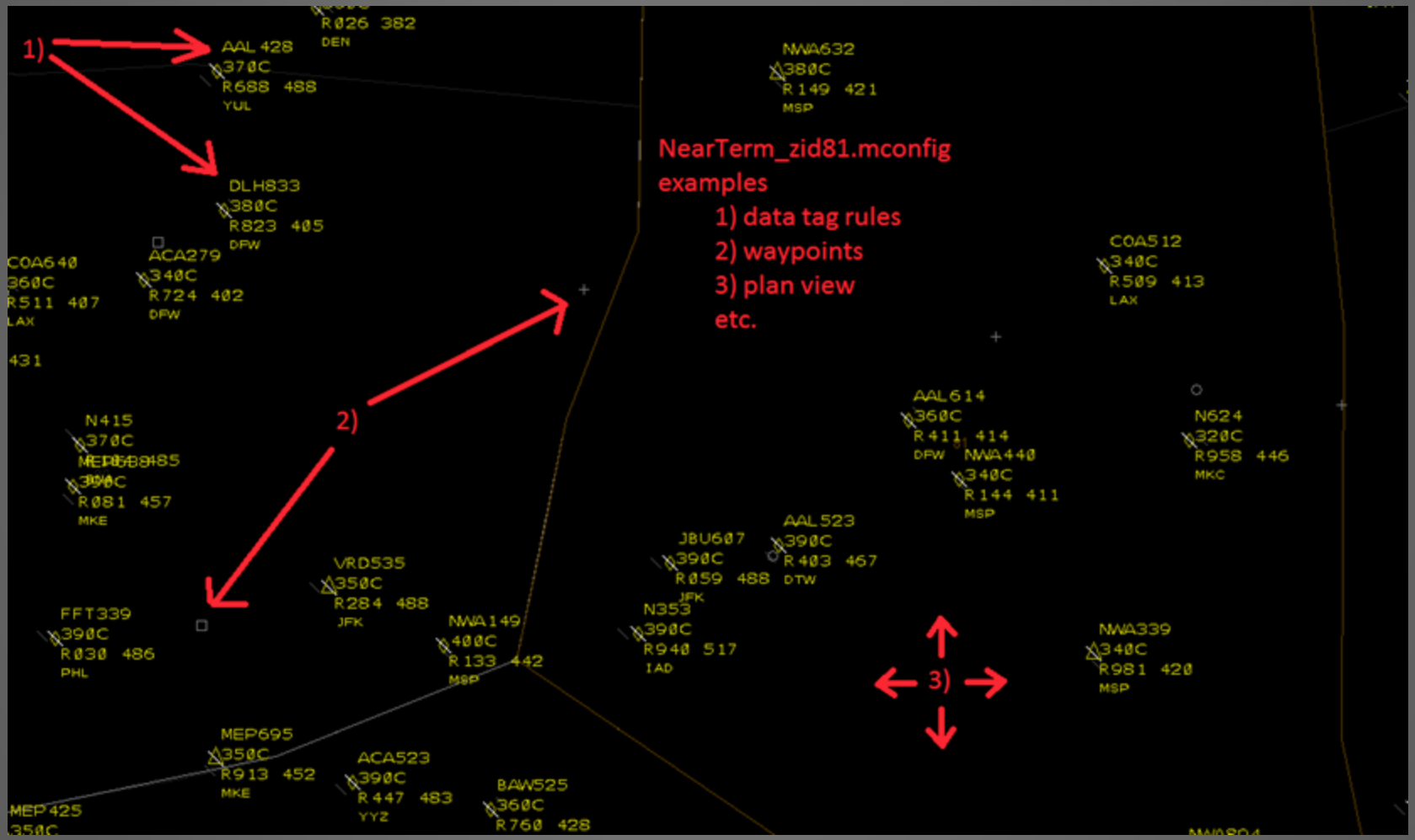
End Result:

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

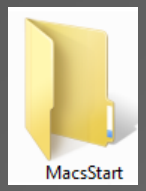



# MACS_Start

## 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