

Automating Workflows with Python

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<https://github.com/pmacMaps>

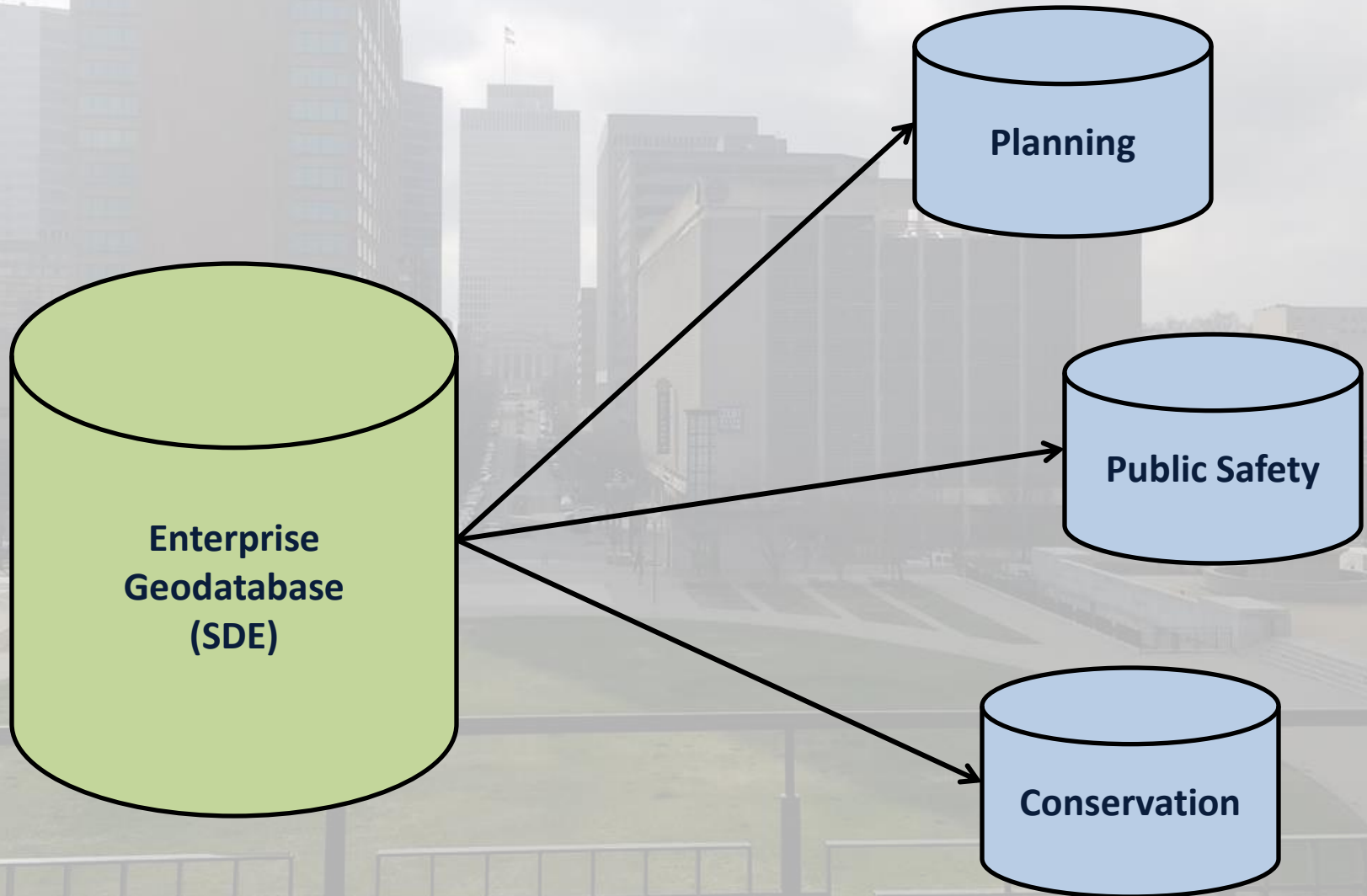


What We'll Discuss

- Case for automation: data replication
- Where to learn Python & ArcPy
- Recap what Python & ArcPy are
- Dissect a data replication script
- Review creating a Windows scheduled task
- Examples of automated scripts



What Is Data Replication?



Many Ways to Replicate

- Run from Distributed Geodatabase toolbar
- Run from geodatabase
- Run from a model
- Run from a script
 - Can be scheduled to repeat

Time Comparison

Manual cost of **6 minutes** per week*

5.5 hours per year

And if you factor other workflows.....

*5 sets of replication occurring each week



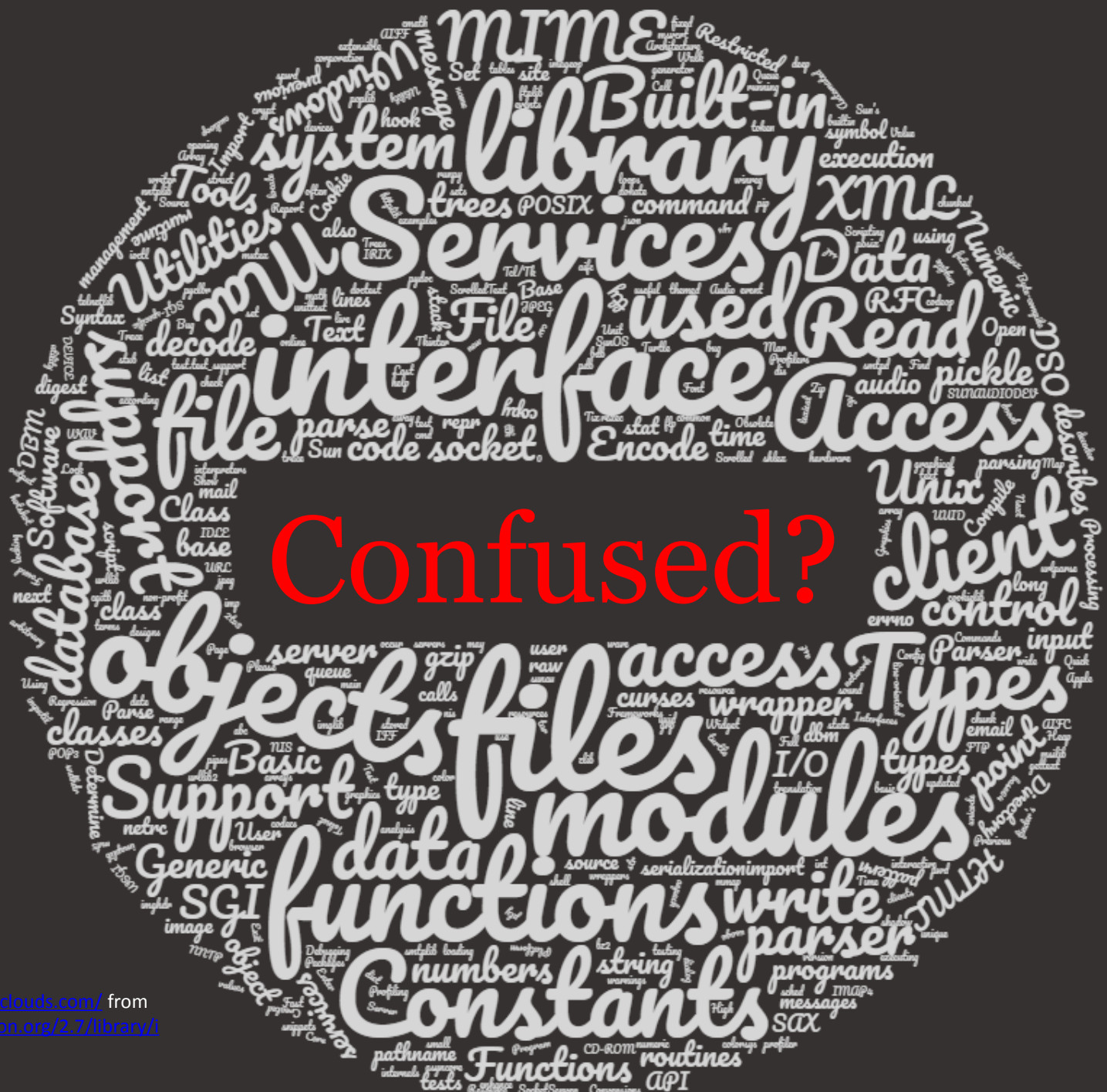
Time Comparison

If it took 5 hours to create script...

1.1 years to gain time profit

The base script can be reused...





Confused?

Created at
<http://www.wordclouds.com/> from
<https://docs.python.org/2.7/library/index.html>



You Can Learn Python!

codecademy

udemy

treehouse™



You Can Learn ArcPy!

- ArcGIS Desktop ArcPy [Reference](#)
- Esri Web [Courses](#) (free & “paid”)
- Introduction to Geoprocessing Scripts Using Python ([Esri Instructor-Led](#))
- uDemy courses ([2 courses](#))
- [GIS StackExchange](#), [StackOverflow](#), [Geonet](#), etc.



What is Python?

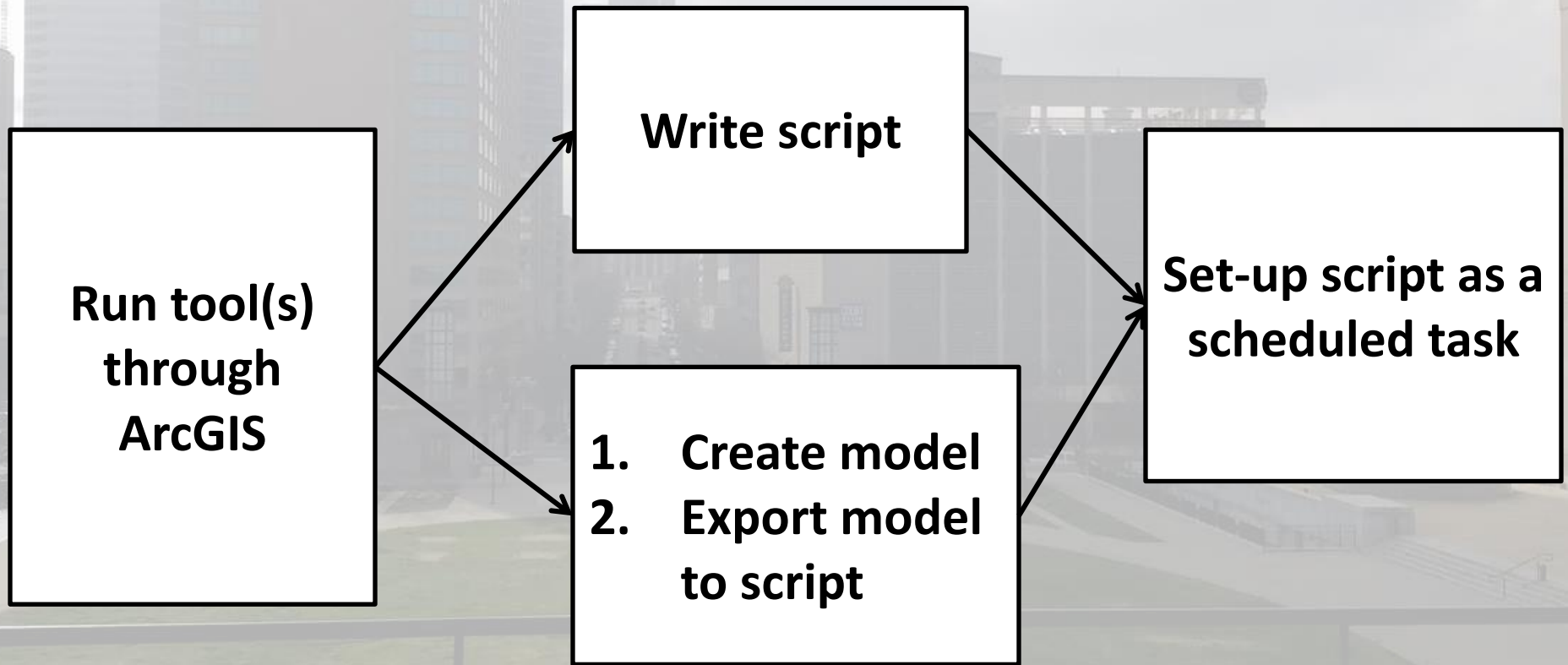
- Simple syntax (easy to learn)
- Runs on Windows, Mac OS X, Linux, and Unix
- Allows for error handling
- Code can be grouped into modules and packages



What is ArcPy?

- Provides access to ArcGIS ecosystem within Python
- You can perform “analysis, conversion, data management, and map automation”
- “[p]rovides access to geoprocessing tools as well as additional functions, classes, and modules that allow you to create simple or complex workflows”

Process Walkthrough

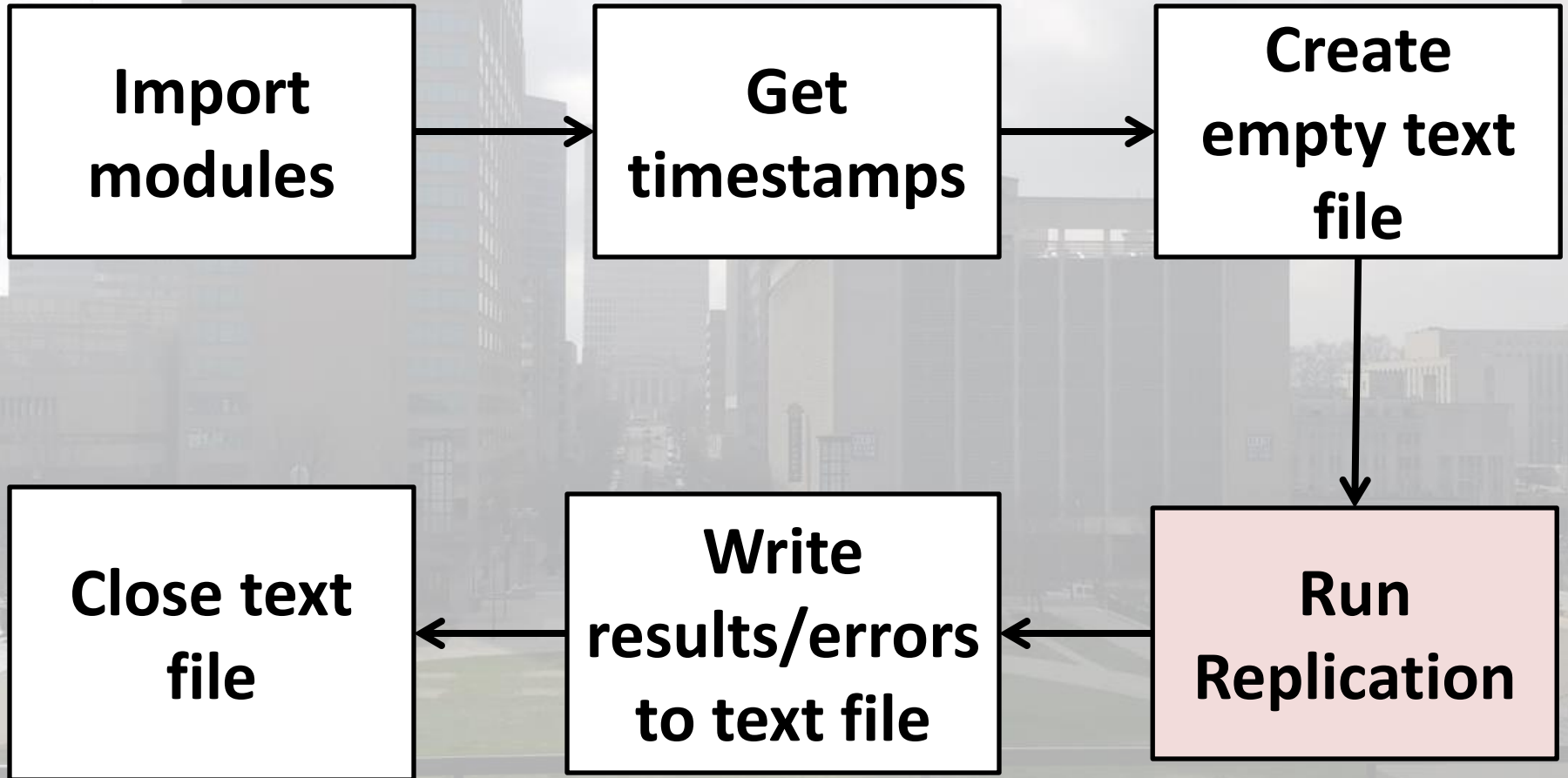


Key Concepts of Script

- Import modules – get access to set of code (error handling, time, operating system, etc.)
- Try/Except statements allow us to catch any errors and do something with them
- Store geoprocessing tool as a variable to access info about tool (i.e., message)
- Record operation of tool to a text file



Script Walkthrough



Dissecting Replication Script

Let's review the data replication script ... ([script on Github](#))



Automating the Script

- Scripts can be run on a schedule using Windows Task Scheduler
- Set-up repeatable schedule to run tasks (every Friday at 6:00 am)
- Use UNC paths in script
- Be aware of user permissions



Creating a Task

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Create Task

General Triggers Actions Conditions Settings

Name: Planning Replication

Location: \

Author: CCPA\pmckinney

Description: Synchronize changes between SDE and Planning Department's file geodatabase.

Security options


When running the task, use the following user account:
CCPA\pmckinney Change User...

Run only when user is logged on
 Run whether user is logged on or not
 Do not store password. The task will only have access to local computer resources.
 Run with highest privileges

Hidden Configure for: Windows® 7, Windows Server™ 2008 R2

OK Cancel

eTask-S-1-5-21-187177...	10/18/2016 1:35:00 PM	At 8:35 AM every day - ...	\
	10/18/2016 2:10:53 PM	Multiple triggers defined	\Microsoft\Windows\RAC



Setting a Task Trigger

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task-S-1-5-21-10/17/... 10/18/2016 1:55:00 PM At 8:55 AM every day * ...
10/18/2016 2:10:53 PM Multiple triggers defined \Microsoft\Windows\RAC

New Trigger

Begin the task: **On a schedule**

Settings

One time

Daily

Weekly

Monthly

Start: 10/21/2016 6:00:00 AM Synchronize across time zones

Recur every: 1 weeks on:

Sunday Monday Tuesday Wednesday

Thursday Friday Saturday

Advanced settings

Delay task for up to (random delay): 1 hour

Repeat task every: 1 hour for a duration of: 1 day

Stop all running tasks at end of repetition duration

Stop task if it runs longer than: 4 hours

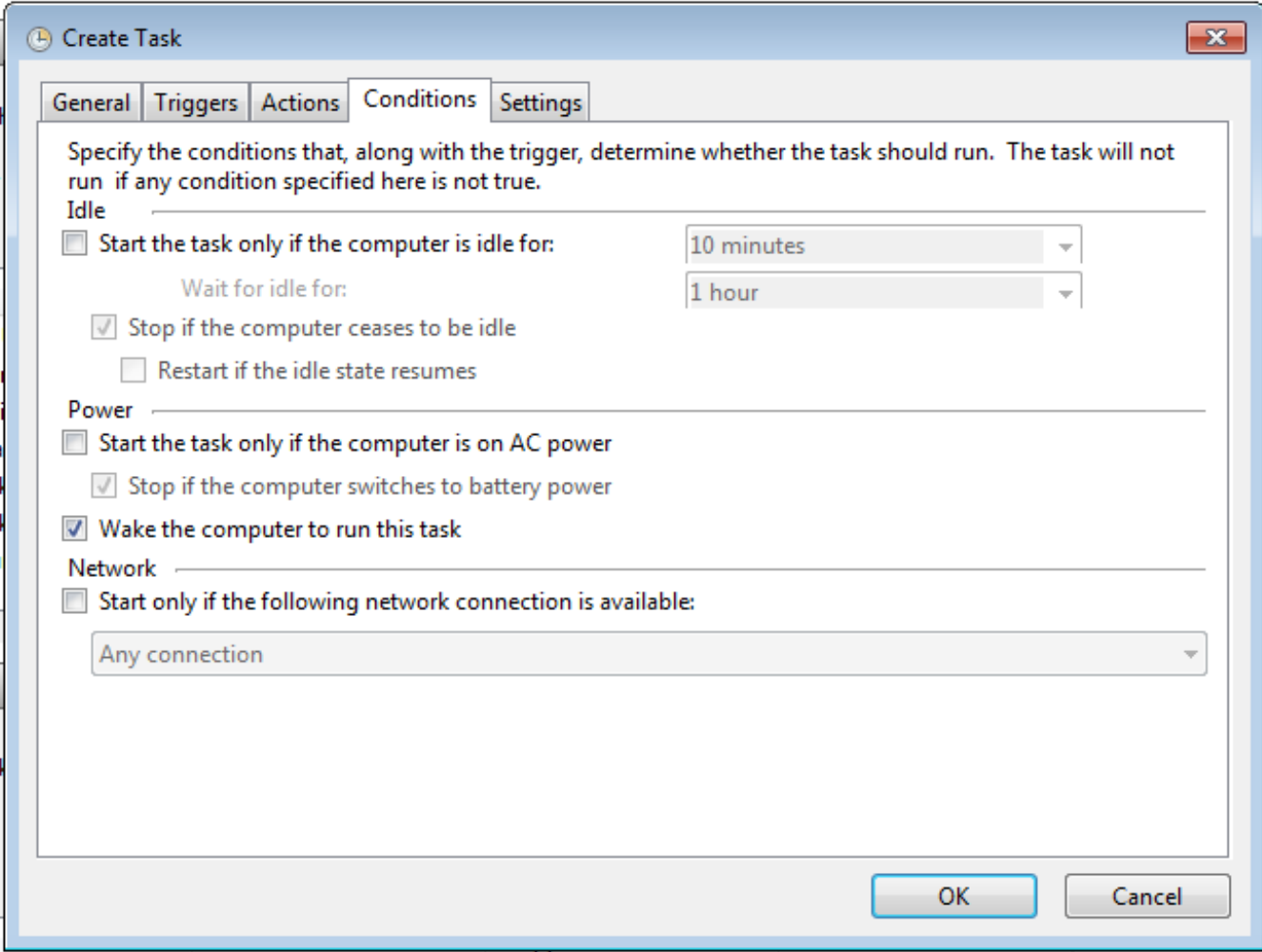
Expire: 10/18/2017 1:30:20 PM Synchronize across time zones

Enabled

OK Cancel



Setting a Task's Conditions



The screenshot shows the 'Create Task' dialog box in Windows, with the 'Conditions' tab selected. The dialog box has a title bar with a clock icon and the text 'Create Task'. Below the title bar are five tabs: 'General', 'Triggers', 'Actions', 'Conditions', and 'Settings'. The 'Conditions' tab is active, and its content is as follows:

Specify the conditions that, along with the trigger, determine whether the task should run. The task will not run if any condition specified here is not true.

Idle

- Start the task only if the computer is idle for: 10 minutes
- Wait for idle for: 1 hour
- Stop if the computer ceases to be idle
- Restart if the idle state resumes

Power

- Start the task only if the computer is on AC power
- Stop if the computer switches to battery power
- Wake the computer to run this task

Network

- Start only if the following network connection is available: Any connection

At the bottom of the dialog box are 'OK' and 'Cancel' buttons.

task-S-1-5-21-187177... 10/18/2016 1:35:00 PM At 8:35 AM every day - ... \



Adjusting a Task's Settings

The screenshot shows the 'Create Task' dialog box with the 'Settings' tab selected. The dialog has a title bar with a clock icon and a close button. Below the title bar are tabs for 'General', 'Triggers', 'Actions', 'Conditions', and 'Settings'. The main content area is titled 'Specify additional settings that affect the behavior of the task.' and contains several options:

- Allow task to be run on demand
- Run task as soon as possible after a scheduled start is missed
- If the task fails, restart every: 5 minute
- Attempt to restart up to: 3 times
- Stop the task if it runs longer than: 4 hours
- If the running task does not end when requested, force it to stop
- If the task is not scheduled to run again, delete it after: 30 days

Below these options is the text 'If the task is already running, then the following rule applies:' followed by a dropdown menu set to 'Do not start a new instance'. At the bottom right are 'OK' and 'Cancel' buttons.

Task-S-1-5-21-187177... 10/18/2016 1:35:00 PM At 8:35 AM every day - ... \



Python Script Examples

- Replicate data to file geodatabases
- Rebuild address locators
- Rebuild tiles for cached map services
- Extract data and upload zipped geodatabase to FTP
- Update datasets from map services*
- Compress enterprise geodatabase*

* In development or example of what is possible



Get in Touch!

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