



Python: Exploring the Ecosystem

Clinton Dow – Geoprocessing Product Engineer

ArcPy: Moving Forward

‘Python is the language of GIS.’ – Bill Moreland, Esri Dev Summit 2016



- **Python 2 vs. 3 in ArcGIS Desktop**

- [Python 2 End of Support Countdown](#)
- ArcGIS 10.5.1 → Python 2.7.12
- ArcGIS Pro 1.4, 2.0 → Python 3.5.2
- ArcGIS Pro 2.1 → Python 3.6.2

Powerful Standard Library Python Modules

Python is a 'Batteries Included' Programming Language

- **Python Standard Library**

- **Collections**

- Utilize common functions on collections of objects

- **Itertools**

- Powerful functions to iterate over collections of objects

- **Pathlib (Python 3.4+)**

- Object-oriented file system paths

- **Requests**

- Easy to use HTTP functionality

Noteworthy Third-Party Packages in ArcGIS

Over 100K User created packages on Python Package Index

- **Numpy**
 - Efficiently manipulate large multi-dimensional arrays
- **SciPy**
 - Functionality for mathematics, science and engineering.
- **Pandas**
 - High performance, easy to use data structures and analysis tools

awesome-python on GitHub

Curated list of the best Python packages as chosen by the GitHub community

Awesome Python awesome

A curated list of awesome Python frameworks, libraries, software and resources.

Inspired by awesome-php.

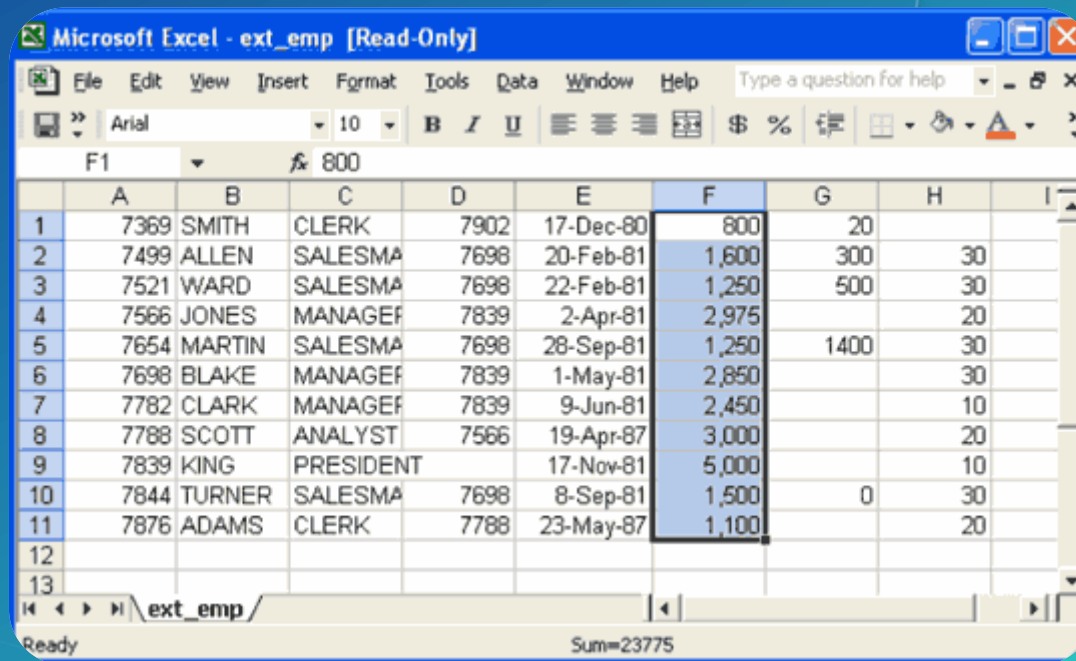
- [Awesome Python](#)
 - [Environment Management](#)
 - [Package Management](#)
 - [Package Repositories](#)
 - [Distribution](#)
 - [Build Tools](#)
 - [Interactive Interpreter](#)
 - [Files](#)
 - [Date and Time](#)
 - [Text Processing](#)
 - [Specific Formats Processing](#)
 - [Natural Language Processing](#)

<https://github.com/vinta/awesome-python>

Extending ArcGIS' Data Interoperability with Python

- **Standard Data Types**

- CSV
 - csv
- Excel
 - Openpyxl
- XML
 - xml.etree
 - xml.dom
 - SAX
- JSON
 - json



The screenshot shows a Microsoft Excel window titled "Microsoft Excel - ext_emp [Read-Only]". The spreadsheet contains 11 rows of employee data. The columns are labeled A through I. The data is as follows:

	A	B	C	D	E	F	G	H	I
1	7369	SMITH	CLERK	7902	17-Dec-80	800	20		
2	7499	ALLEN	SALESMAN	7698	20-Feb-81	1,600	300	30	
3	7521	WARD	SALESMAN	7698	22-Feb-81	1,250	500	30	
4	7566	JONES	MANAGER	7839	2-Apr-81	2,975		20	
5	7654	MARTIN	SALESMAN	7698	28-Sep-81	1,250	1400	30	
6	7698	BLAKE	MANAGER	7839	1-May-81	2,850		30	
7	7782	CLARK	MANAGER	7839	9-Jun-81	2,450		10	
8	7788	SCOTT	ANALYST	7566	19-Apr-87	3,000		20	
9	7839	KING	PRESIDENT		17-Nov-81	5,000		10	
10	7844	TURNER	SALESMAN	7698	8-Sep-81	1,500	0	30	
11	7876	ADAMS	CLERK	7788	23-May-87	1,100		20	

The status bar at the bottom shows "Ready" and "Sum=23775".

Extending Analysis in ArcGIS with Python

Utilize the Extended Python Ecosystem in your ArcGIS Tools

- Scientific

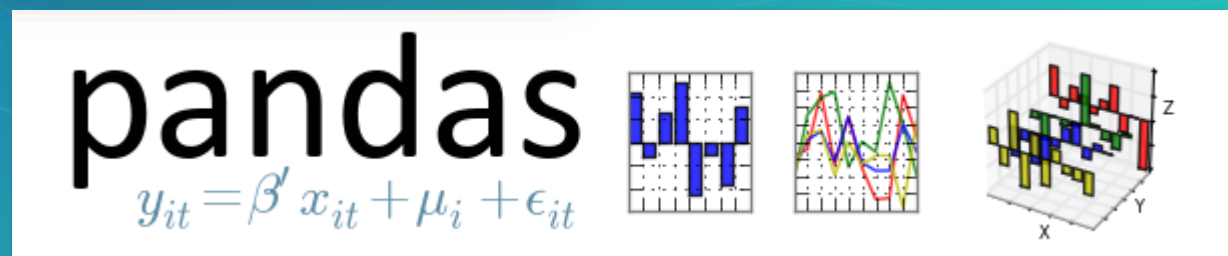
- NumPy
- SciPy
- PySAL
- SciKit Learn

- Visualization

- matplotlib
- Bokeh
- Plotly
- d3py

- Data Science

- Jupyter
- Pandas
- Dask
- Blaze



Extending ArcGIS with Python Modules

Utilize the Extended Python Ecosystem in your ArcGIS Tools

- Web Framework
 - Django
 - GeoDjango
 - Flask
 - Pyramid
- Web-Scraping
 - BeautifulSoup
 - Scrapy
- Web Service API
 - Twitter
 - AWS
 - ElasticSearch



Pyramid™

Finding and installing Packages with Conda in ArcGIS Pro

'Conda' Virtual Environment & Package Manager

- **Conda integration into ArcGIS**

- **Advanced Python Environment Support**
 - Manage multiple environments with access to ArcPy
 - Easily share environments
 - Install different packages/versions per environment
- **Easy to use Package management**
 - Integrated into ArcGIS Pro UI
 - Ensures Package dependencies are installed properly
 - Explore the best Python packages without leaving ArcGIS Pro

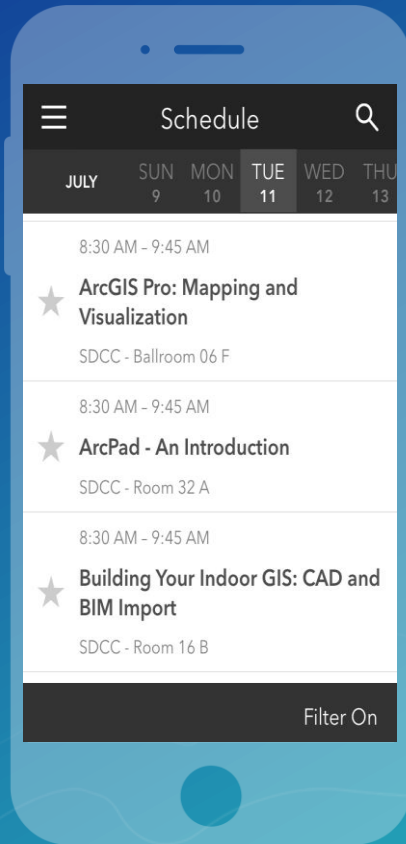
The Conda logo is displayed in a large, bold, green font. The letter 'C' is stylized with a white, jagged, snake-like pattern winding through it. The letters 'ONDA' are in a solid green font. The logo is set against a background of light blue and green wavy lines.

Please Take Our Survey on the Esri Events App!

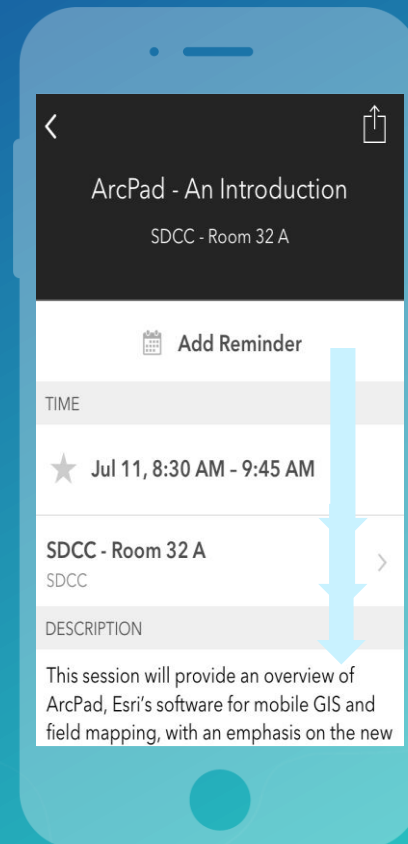
Download the Esri Events app and find your event



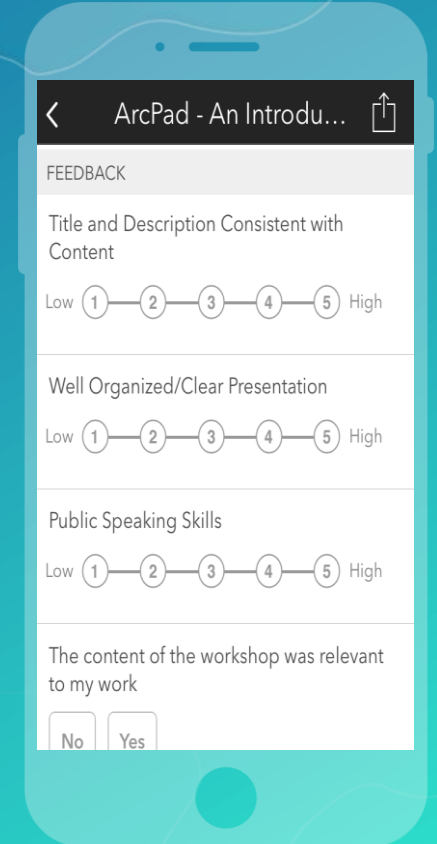
Select the session you attended



Scroll down to find the survey



Complete Answers and Select "Submit"





esri

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SCIENCE
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