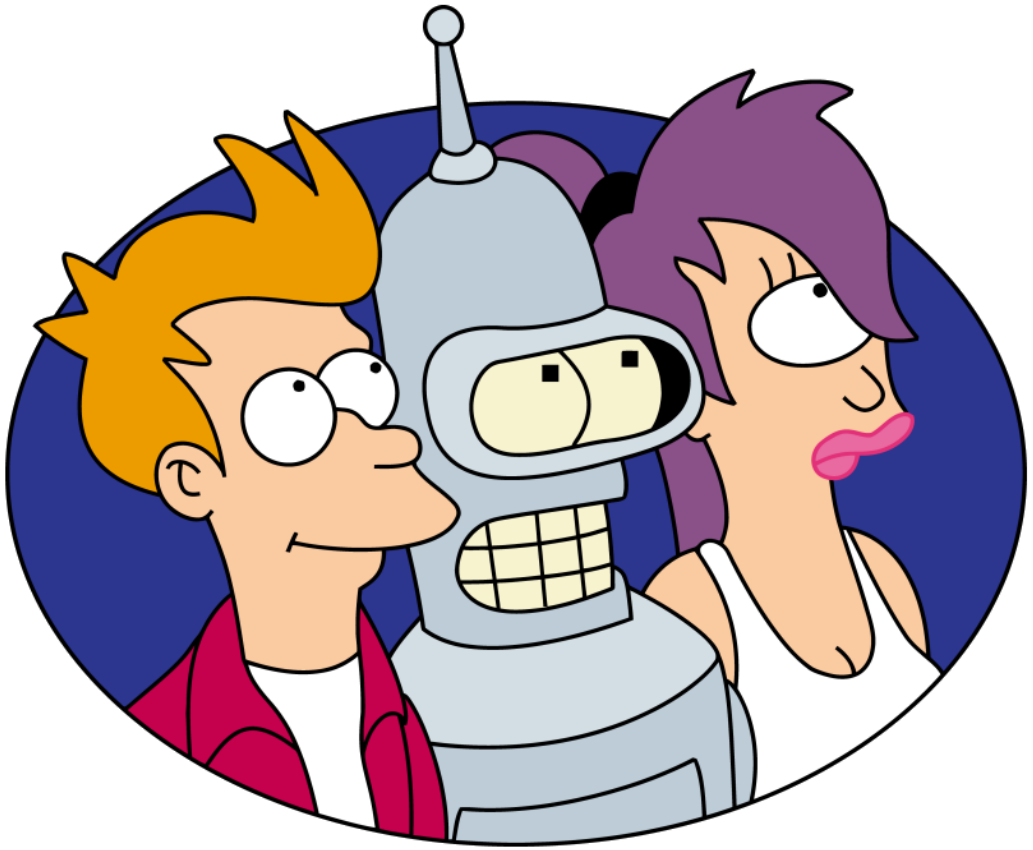
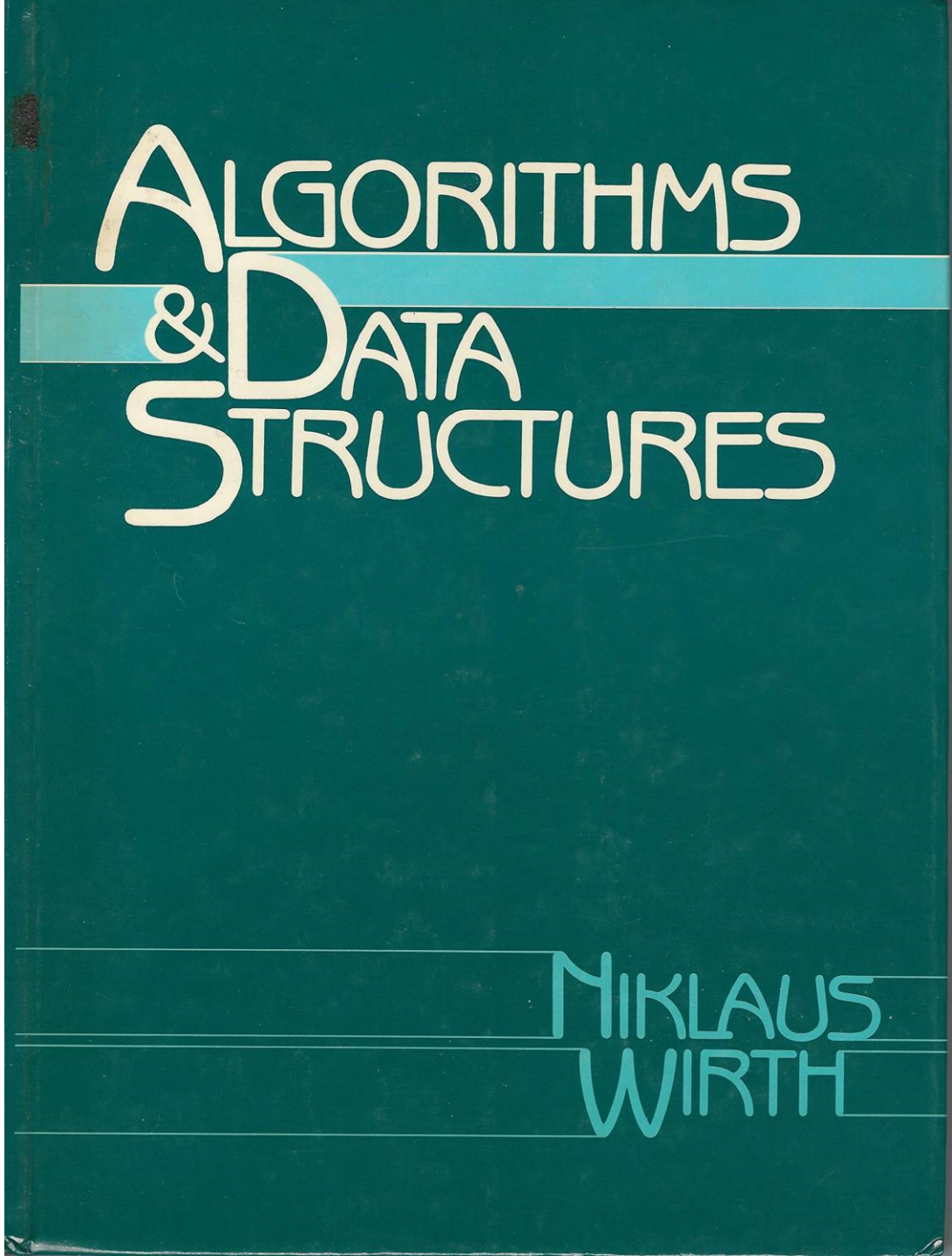
Machines should work;
people should think.



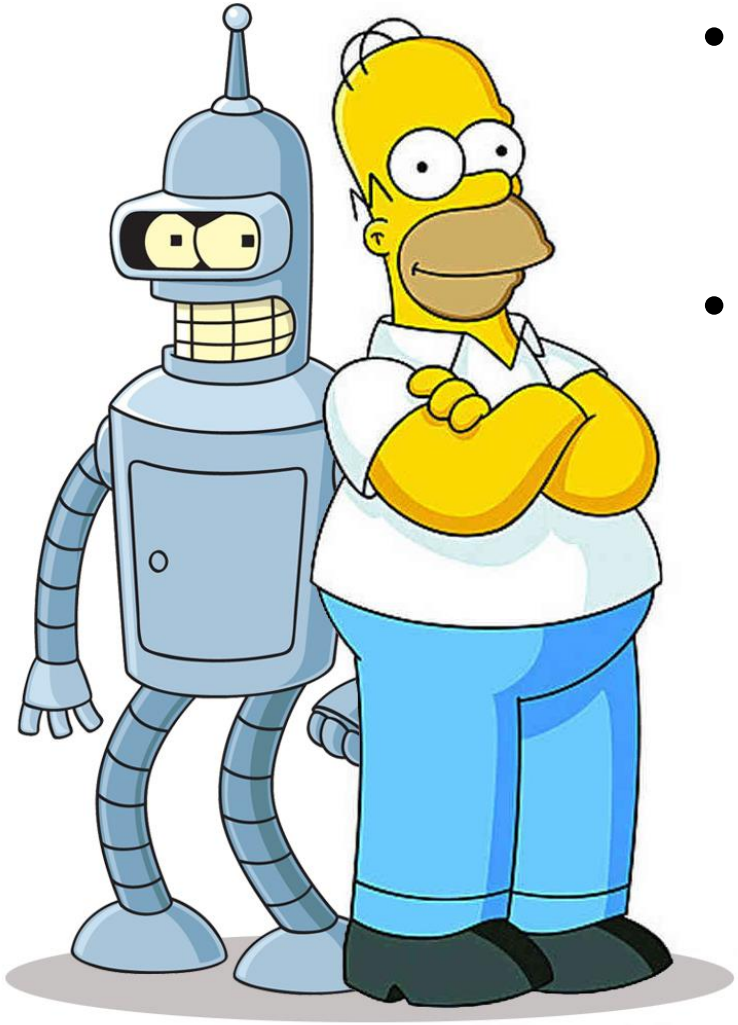
IBM

Programs = Algorithms + Data Structures

- **Programming** is process of writing instructions that get executed by computers
  - → Recipe how to cook an apple pie with creams
- **Algorithms** are sequence of instructions for approach to a class of problems
  - → Generic instruction how to cook a pie
- **Data structures** are used to facilitate algorithms
  - → Ingredients for a recipe



JSON: JavaScript Object Notation



- JSON is a syntax for storing and exchanging data
- JSON is text, written with JavaScript object notation
  - →Easy to handle by *both* people and computers
  - →Readable and correspond to data structures
  - →Allows for complex, hierarchical data

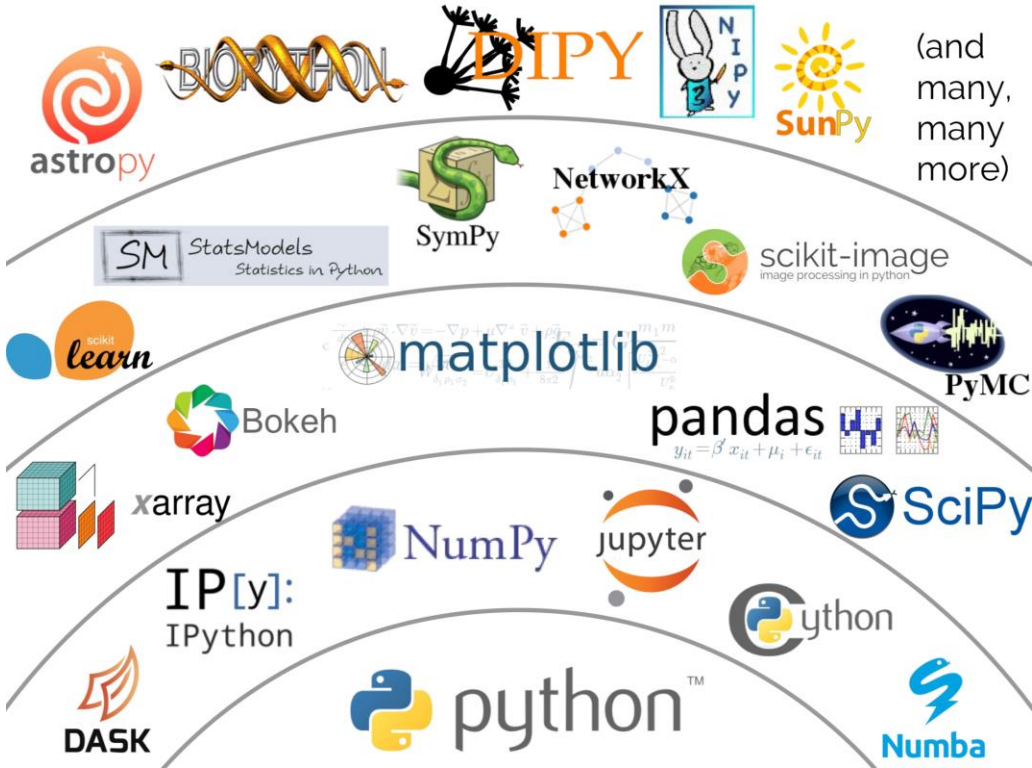
```
{
  "first name": "John",
  "last name": "Smith",
  "age": 25,
  "address": {
     "street address": "21 2nd Street",
     "city": "New York",
     "state": "NY",
     "postal code": "10021"
  },
  "phone numbers": [
     {
        "type": "home",
        "number": "212 555-1234"
     },
     {
        "type": "fax",
        "number": "646 555-4567"
     }
   ],
   "sex": {
      "type": "male"
    }
}
```

API: **A**pplication **P**rogramming **I**nterface

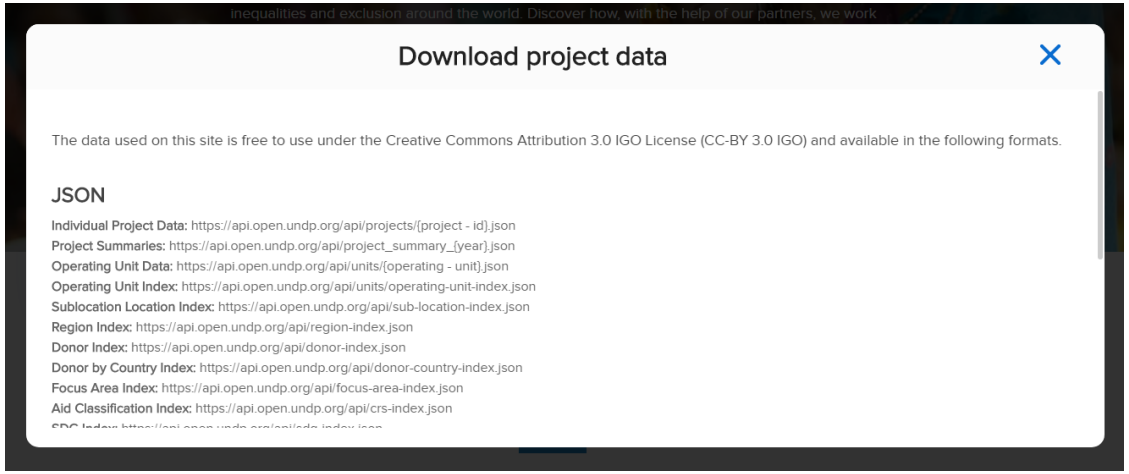
- The way to talk between programs
- API is like a waiter:
  1. Receives a set of instructions (a request) from a source (such as an application or engineer)
  2. Takes that request to the back office
  3. Fetches the requested data or facilitates a set of actions
  4. Returns a response to the source
- Examples:
  - UNSTAT SDG https://unstats.un.org/SDGAPI/swagger/
  - WorldBank Data https://bit.ly/2PXySTS

Python

- Python is an **interpreted**, **high-level**, general-purpose programming language
- Pros:
  - Simple and easy-to-understand syntax
  - Good data structures
  - Extensive library
  - Open Source and large community support
  - *Superman* of Data Science
  - (…and **R** is *Batman* of Data Science)
- Cons:
  - Python is s…l…o…w…
  - Since Python is dynamic, more errors show at run-time.



open.undp.org

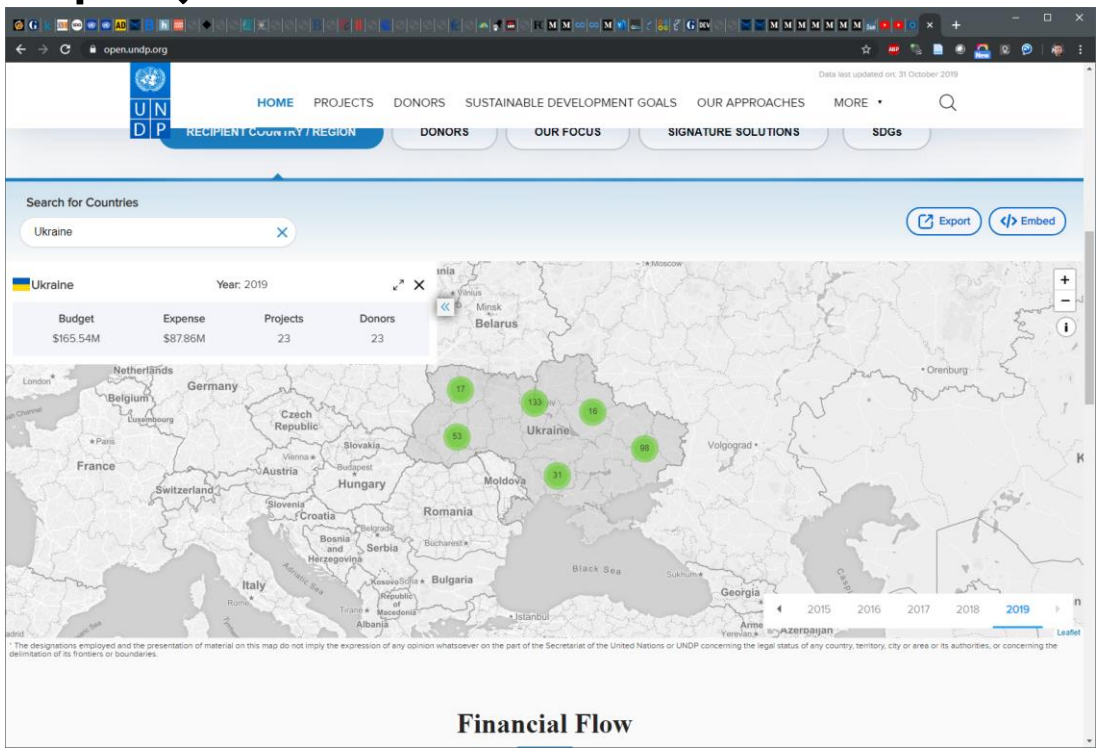


https://api.open.undp.org/api/projects/00099918.json

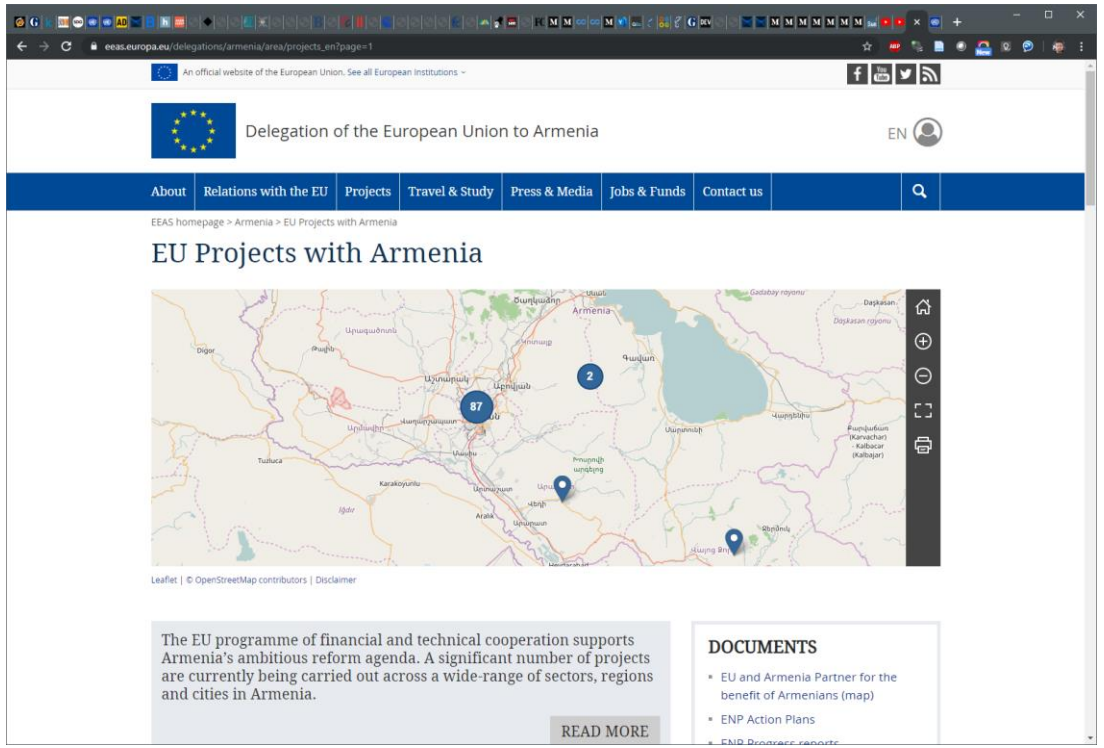
{"project_descr":"Supporting the implementation of the Sustainable Development Goals locally in Ukraine.","fiscal_year":[2019,2018],"end":"2020-12-31","region_id":"RBEC","operating_unit_id":"UKR","operating_unit_email":"registry.ua@undp.org","budget":3464896.0,"expenditure":1328010.0,"start":"2018-10-01","document_name":[["Purchase 6 cars (crossover)","HOUSES_Description of Action"],["http://procurement-notices.undp.org/view_notice.cfm?notice_id=51957","https://info.undp.org/docs/pdc/Documents/UKR/HOUSES_Description of Action.pdf"],["html","pdf"]],"project_id":"00099918","project_title":"Support to SDGs localization in Ukraine","outputs":[{"crs":"23210","output_descr":"1. Mobilize home owners to set up their associations \n2. Operational, project design and implementation capacities of new or pre-existing Home Owners' Associations (HOAs) are developed and stregthen","output_id":"00103123","award_id":"00099918","output_title":"HOUSES","crs_descr":"","donor_id":["10159"],"disbursement":[],"focus_area":"18","gender_descr":"Gender Equality","budget":[2378865.0,582517.0],"fiscal_year":[2019,2018],"gender_id":1,"expenditure":[1029909.0,217608.0],"donor_short":["EUCOMM"],"donor_name":["EUROPEAN COMMISSION"],"focus_area_descr":"Accelerate structural transformations","markers":[{"marker_type":["Capacity Development / Technical Assistance","Convening / Partnerships / Knowledge Sharing"],"marker":"Hows"},{"marker_type":["National government","Sub-national government"],"marker":"Partner"},{"marker_type":["People living in peri-urban areas","People living in urban areas"],"marker":"Whos"}],"sdg":[{"expenditure":[108804.0,514954.5],"id":"7","name":"Affordable and clean energy","year":[2018,2019],"budget":[291258.5,1189432.5]},{"expenditure":[108804.0,514954.5],"id":"9","name":"Industry, innovation and infrastructure","year":[2018,2019],"budget":[291258.5,1189432.5]}],"signature_solution":"Close the energy gap"},{"crs":"23210","output_descr":"Empowered Partnership for Sustainable Development Programme in Ukraine – to contribute to more efficient public administration, capable to interact and work to promote sustainable development and Ukraine's approximation towards EU.“ <. . .>

Two examples

- What can we learn from *our* project data?



- How could we get others data?



mihail.peleah@undp.org

Thank you for attention!

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