

Human-Computer Interaction

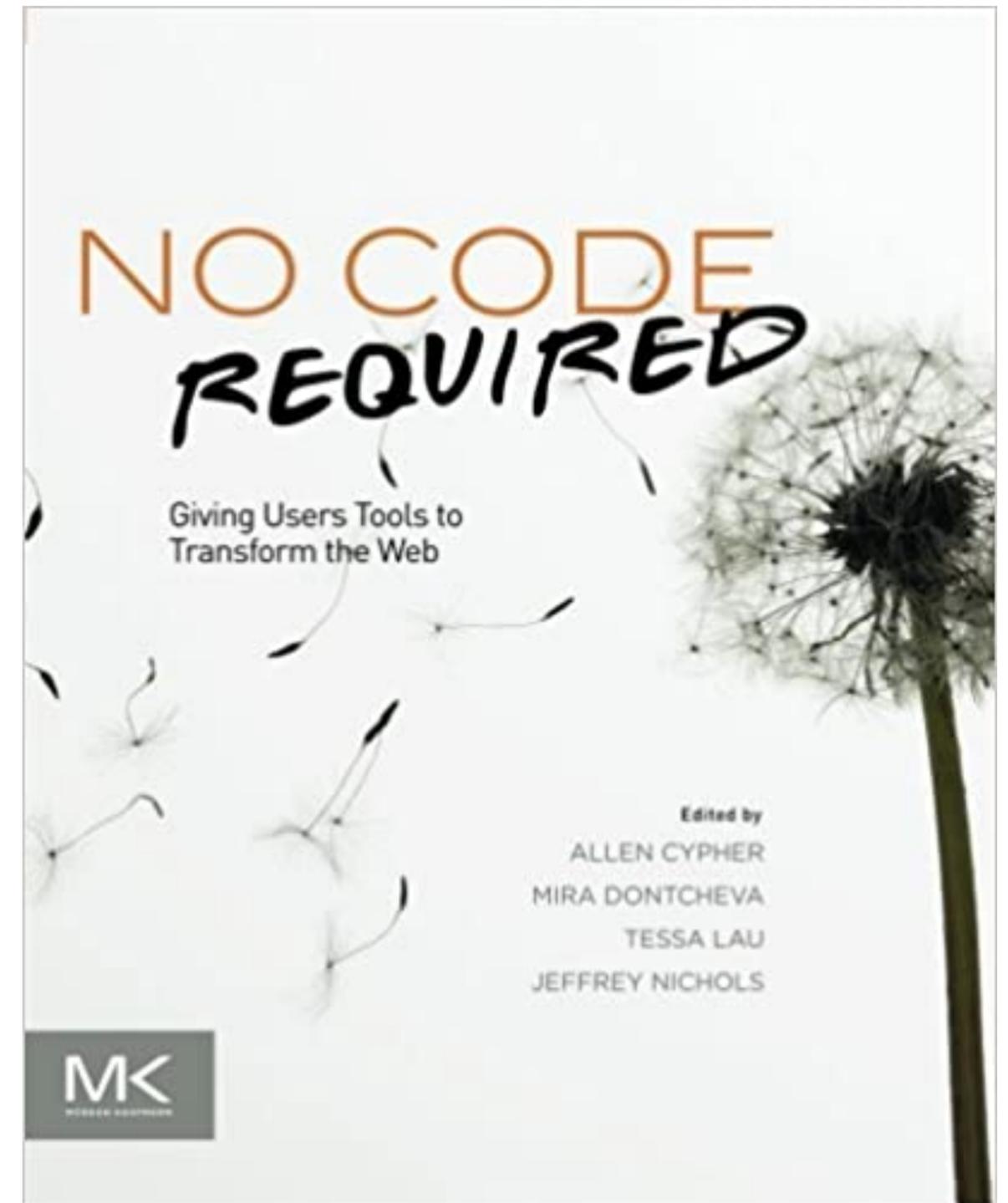
Authoring & End-User Programming

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Today's Agenda

- >> Q&A: *Assignment, project next steps & deliverables*
- >> Topic overview: *Authoring & end-user programming*
- >> Discussion: *Breakout groups discuss (10 min), general discussion (10 min)*

Cyper et al., 2010, No Code Required:
Giving Users Tools to Transform the
Web



What is end-user programming?

Definition: "Activities and tools that allow end-users—people who are not professional software developers—to program computers," specifically "tools to create or modify software artifacts (descriptions of automated behavior) and complex data objects without significant knowledge of a programming language."¹

Academic definition: "End-User Development can be defined as a set of methods, techniques, and tools that allow users of software systems, who are acting as non-professional software developers, at some point to create, modify or extend a software artifact."²

¹Wikipedia: [End-user development](#)

²Lieberman et al., 2006, [End-User Development: An Emerging Paradigm](#)

Why do end users want to program?

1. **Customization:** Adapting complex services to individual needs and circumstances. E.g., setting up voice mail, connecting systems.
2. **Automation:** Creating routines to perform recurring tasks. E.g., paying monthly bills, recording a TV show.

Approaches to end-user programming

1. Scripting
2. Structure editors
3. Visual programming
4. Programming by demonstration
5. Sloppy programming

Scripting

Definition: "Scripting languages approach end user programming by still using a programming language, but by making that language simpler and easier to use. To accomplish this, they may restrict their solutions to a limited domain – such as spreadsheets or Web pages – and offer only limited power within that domain."^[^3]

[^3] ?

What are some examples?

Chickenfoot⁴ mission "a user should not have to view the HTML source of a Web page to customize or automate it."



⁴Miller et al., 2010, Rewriting the web with Chickenfoot

The image shows a Mozilla Firefox browser window displaying the Google Image Search interface. On the left, a script editor window is open, showing a JavaScript function named `doIconSearch()` designed to add a search icon and filter the results to small GIF images. The main browser window shows the Google logo, a search bar with the text "pencil", and a "Search Images" button. Below the search bar, there are several image thumbnails with labels: "World's Fair", "Academy Awards", "Apollo 11", and "Marilyn Monroe".

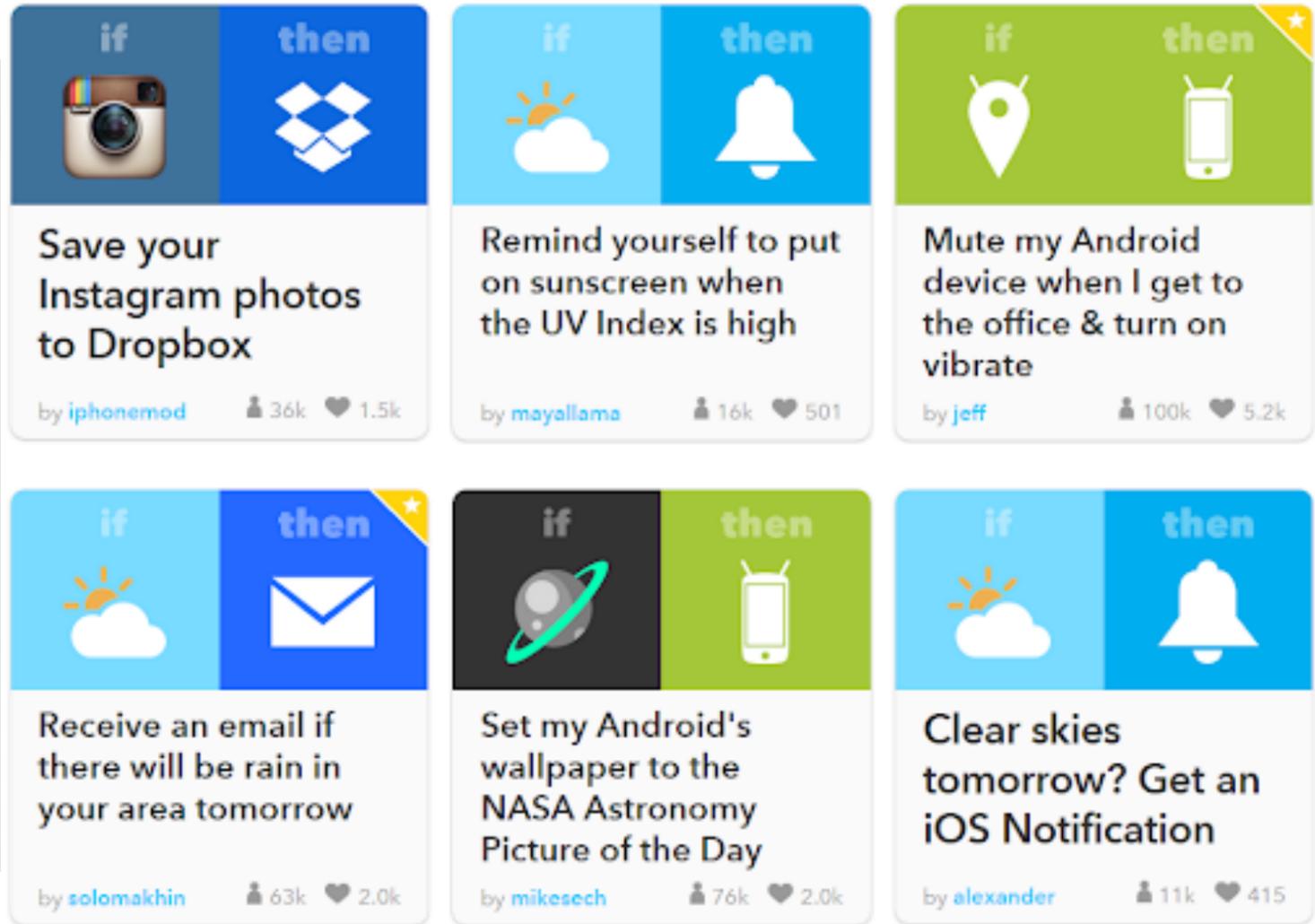
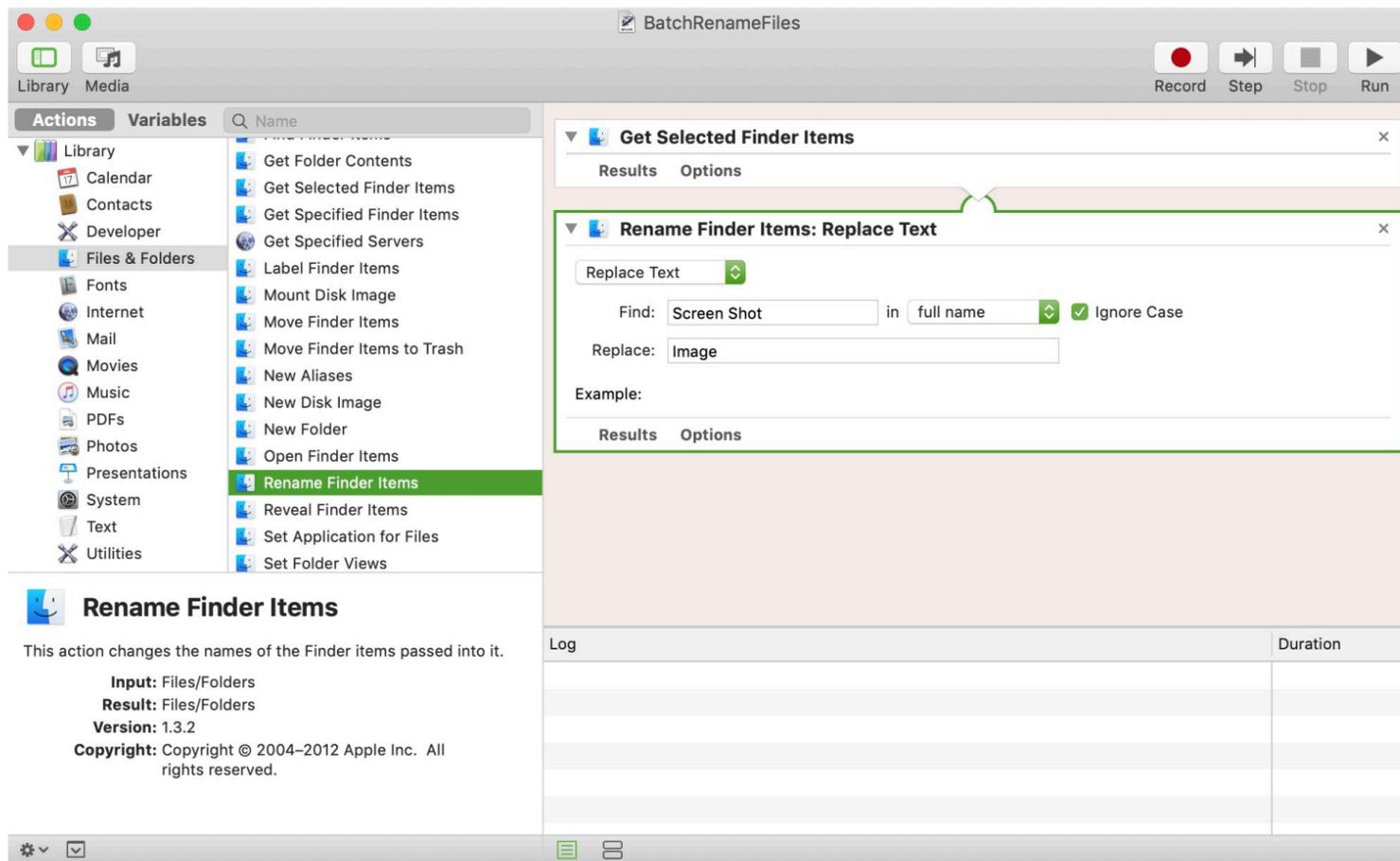
Two callouts, labeled 'b' and 'c', provide detailed views of the search interface. Callout 'b' shows the "Advanced Image Search" options, including "Find results" (related to all, exact phrase, any, or not related to words), "Content types" (any, news, photo, clip art), "Size" (small, medium, large), "Exact size" (width and height), "Filetypes" (GIF files), and "Coloration" (any colors). Callout 'c' shows the search results page for "pencil filetype:gif", displaying a grid of small image thumbnails with their respective titles and URLs, such as "Pencils" from hampshirepromotionalgifts.co.uk and "Flash drawing by pencil" from fastvault.net.

Structure editors

Definition: An approach to making scripting languages easier, "where the end user creates commands by selecting words from menus, and the editor guarantees that only legal combinations of words can be selected."⁵

⁵Cyper, 2010, [End user programming on the Web](#)

What are some examples?⁶



⁶Image sources: [Left](#), [Right](#)

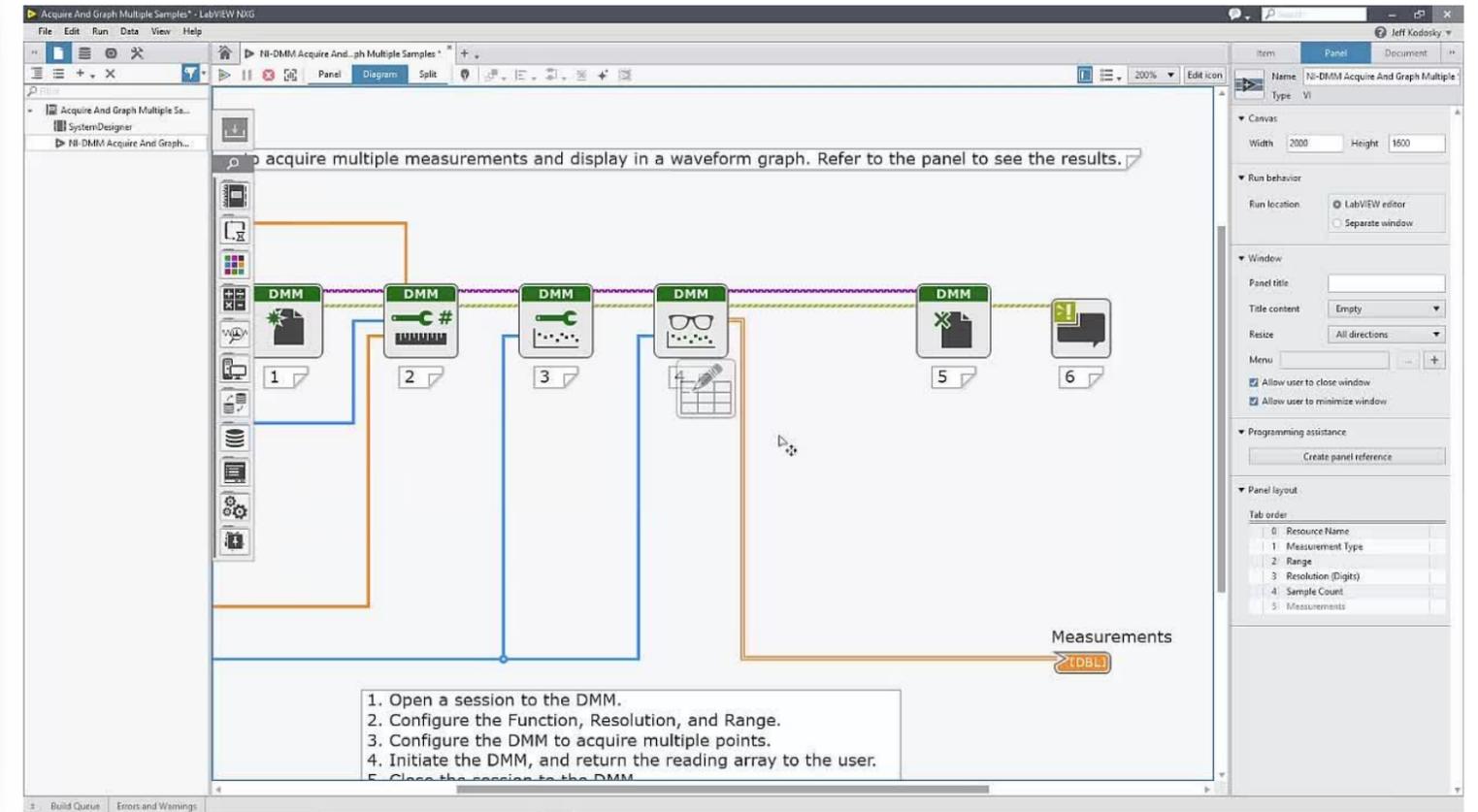
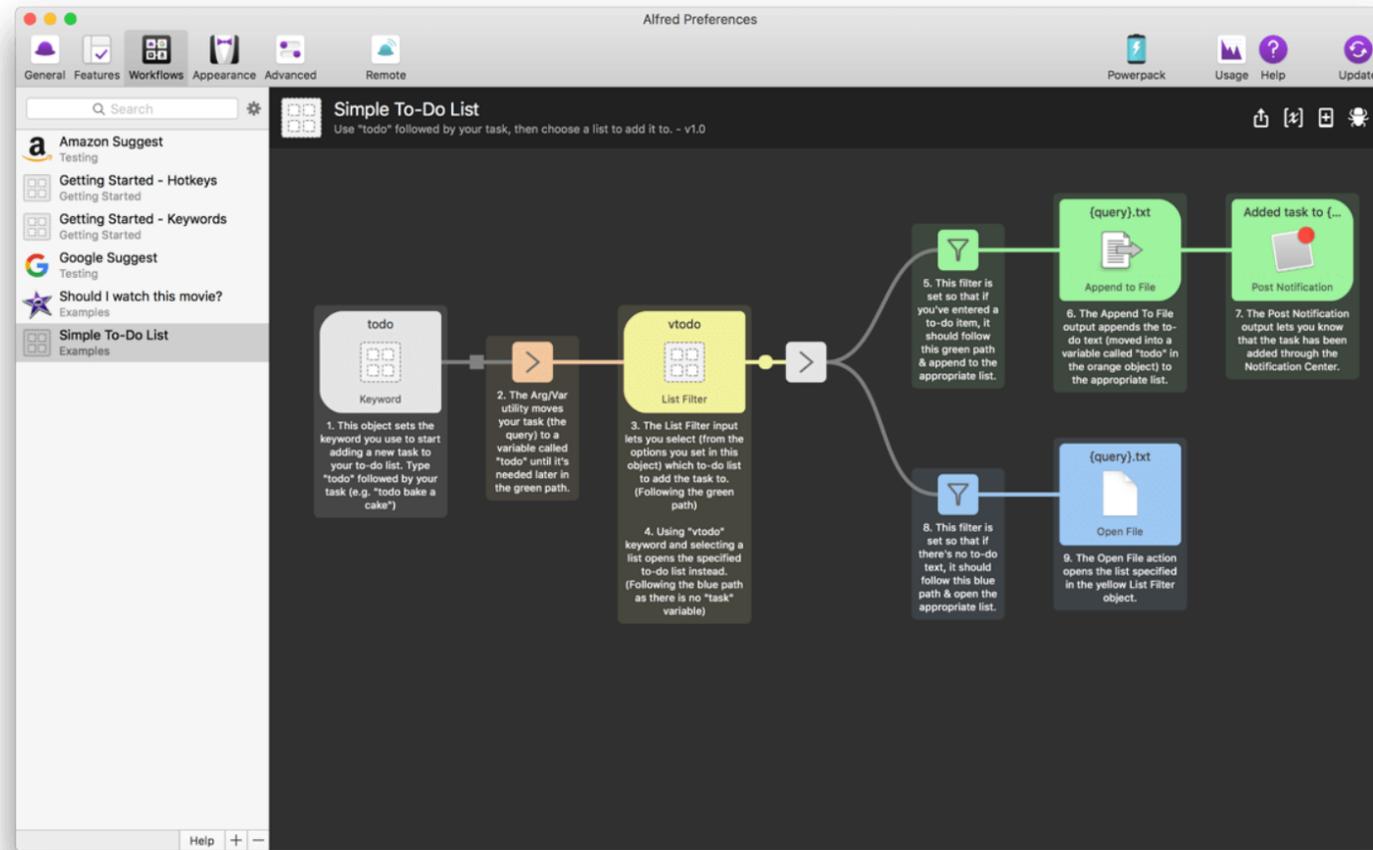
Visual programming

Definition: A "visual programming language (VPL) is any programming language that lets users create programs by manipulating program elements graphically rather than by specifying them textually."⁷

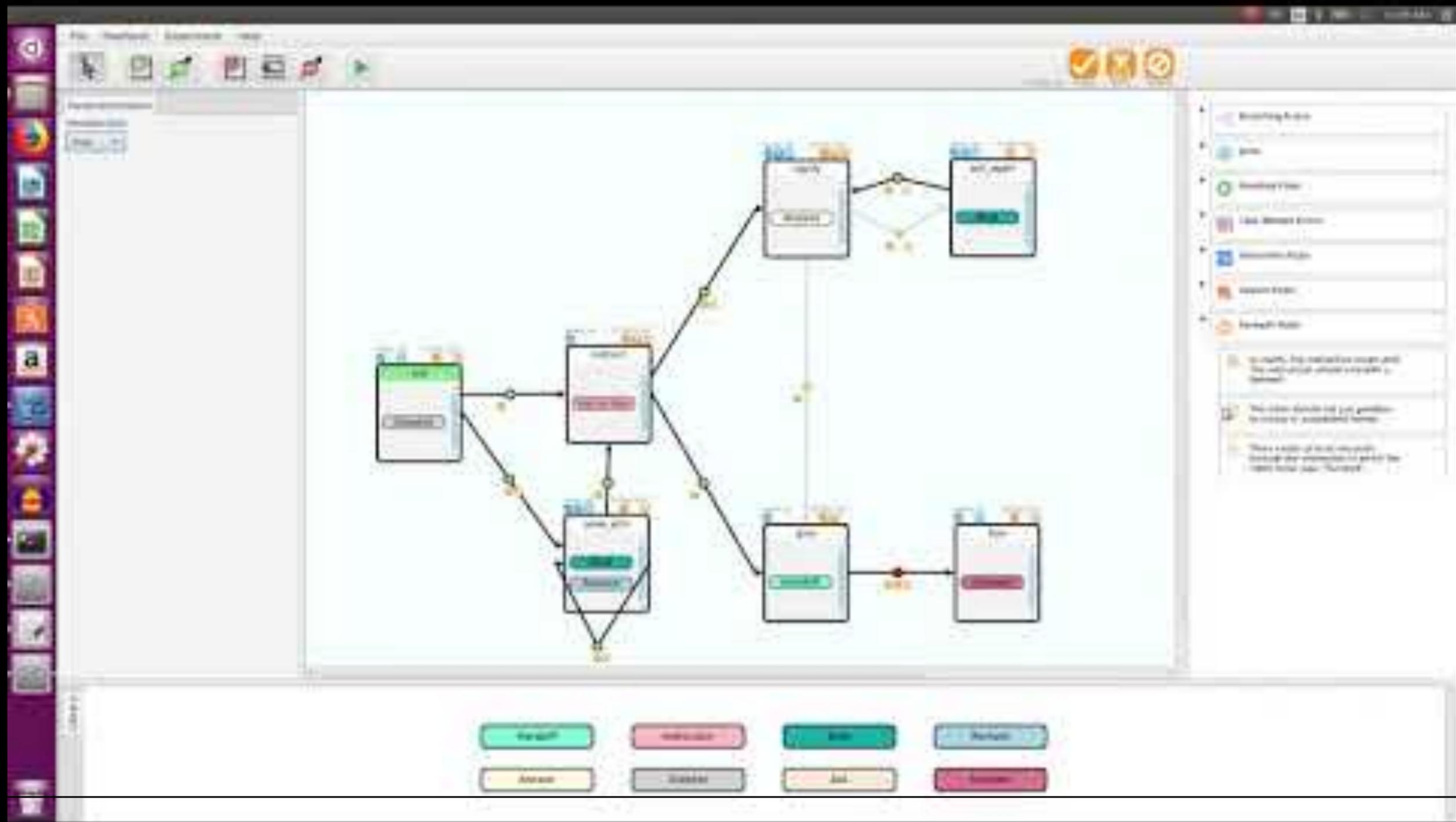


⁷Wikipedia: [Visual programming language](#)

What are some examples?⁸



⁸ Image sources: [Left](#), [Right](#)

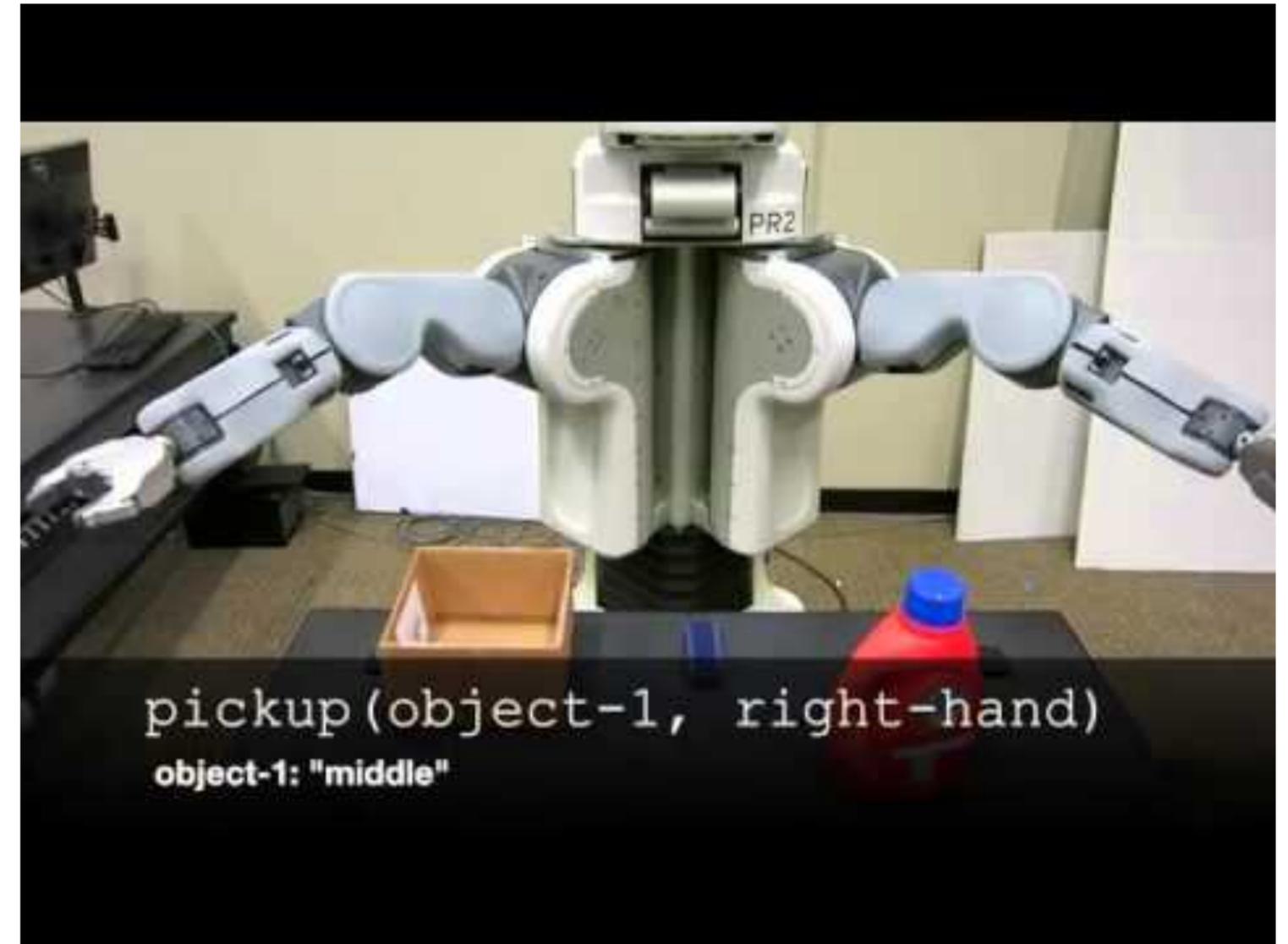
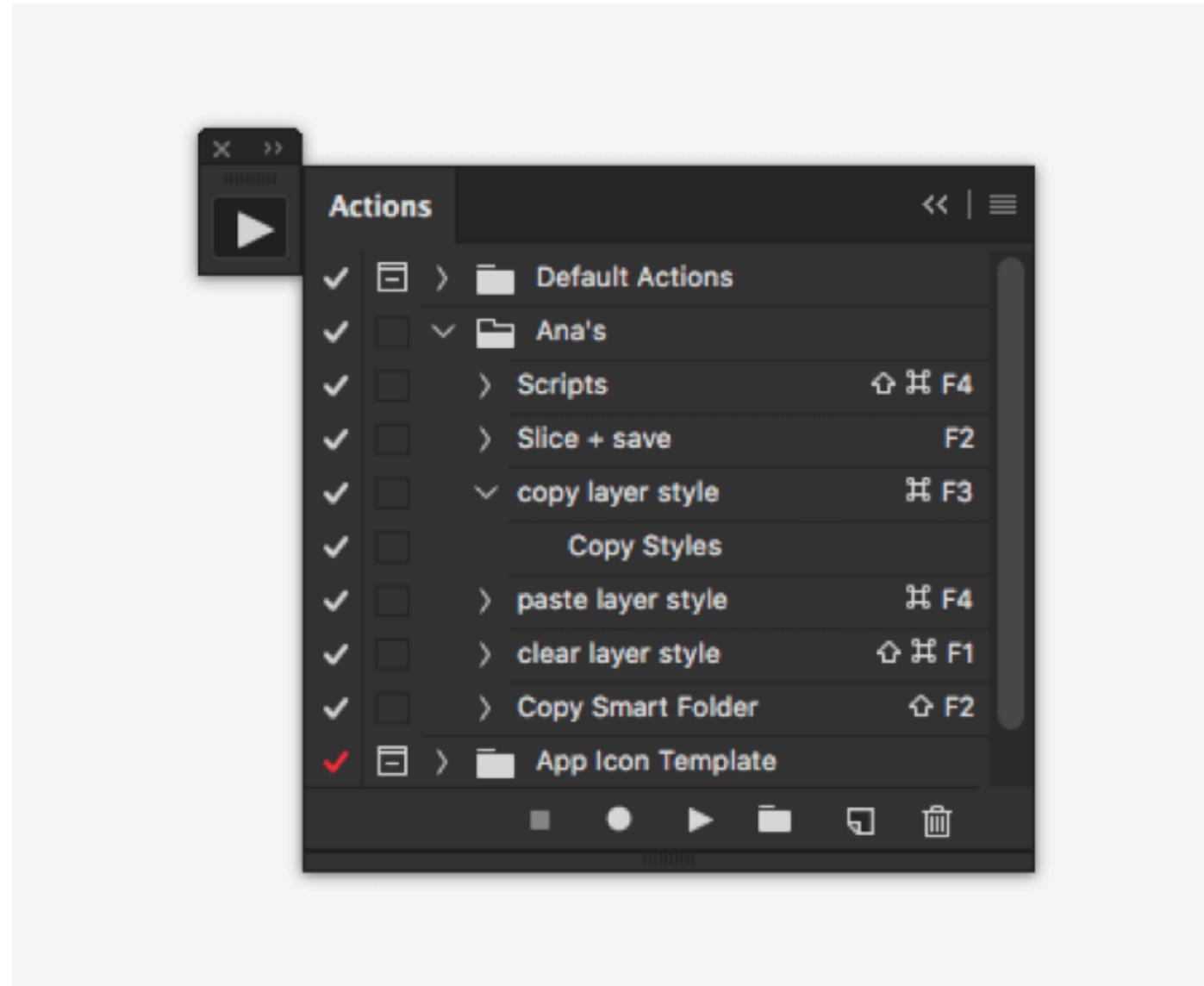


Programming by demonstration

Definition: Programming by demonstration (PBD) is an innovative paradigm that can enable novice users to build a program by just showing a computer what users do.¹⁰

¹⁰Cypher, 1993, [Watch what I do: Programming by demonstration](#)

What are some examples?¹¹



¹¹ Sources: [Right](#), [Left](#)

Microphone



*Sloppy programming*¹³

Definition: The essence of sloppy programming is that the user should be able to enter something simple and natural, like a few keywords, and the computer should try everything within its power to interpret and make sense of this input.

An example

User types “left margin 2 inches” in a sloppy command-line interface for Microsoft Word

ActiveDocument.PageSetup.LeftMargin = InchesToPoints(2)

¹³Little et al., 2010, [Sloppy programming](#)

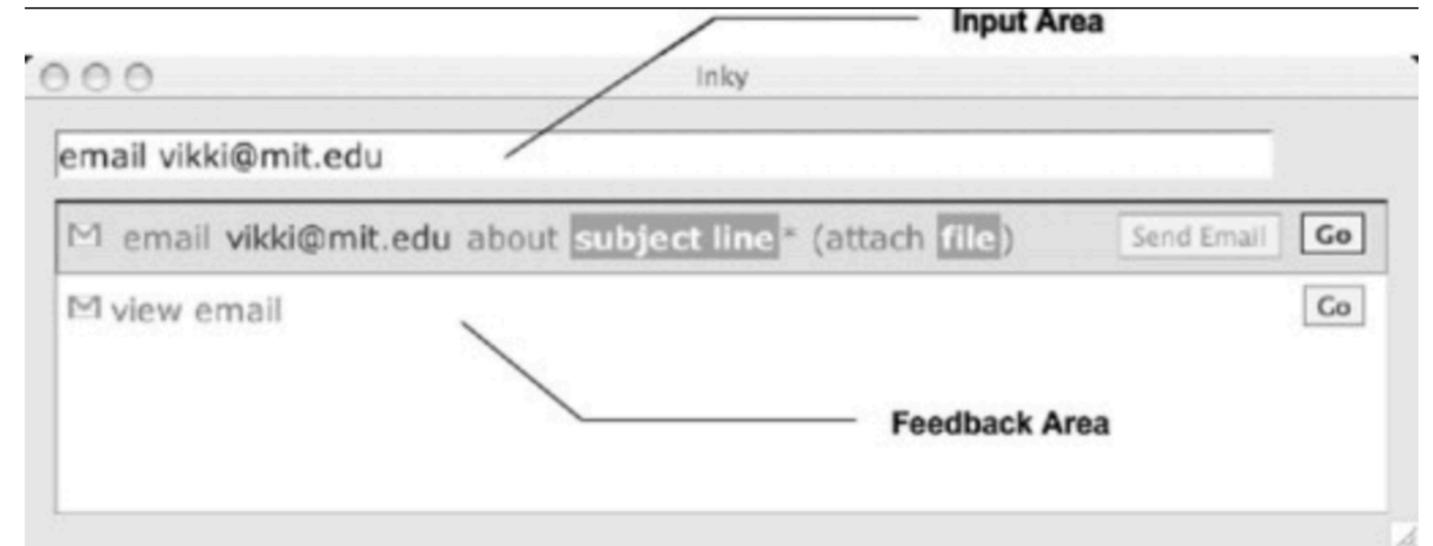
What are the benefits of this approach?

1. No punctuation or grammar requirements; the user can be *sloppy*
2. No requirement to follow particular syntax or method
(`InchesToPoints()`) invocation
3. No need to know property names (`LeftMargin`) or which object
(`ActiveDocument`) the property belongs to
4. The use of pure text is intuitive, universal, and very easy to use

Sloppy web command-line interface¹⁴



Inky¹⁵



¹⁴Little & Miller, 2006

¹⁵Miller et al., 2008

Discussion Questions

- >> What authoring/end-user programming tools do you use?
- >> What are strengths and weaknesses of this approach?
- >> What are opportunities and challenges do you see in this space?
- >> What external resources did you find?