

# Computational models

# Data interpretation

Programs describe the input to an algorithm

**Example:** graphviz

```
/* courtesy Ian Darwin and Geoff Collyer, Softquad Inc. */
```

```
digraph unix {  
    size="6,6";  
    node [color=lightblue2, style=filled];  
    "5th Edition" -> "6th Edition";  
    "5th Edition" -> "PWB 1.0";  
    "6th Edition" -> "LSX";  
    "6th Edition" -> "1 BSD";  
    "6th Edition" -> "Mini Unix";  
    "6th Edition" -> "Wollongong";  
    "6th Edition" -> "Interdata";  
    "Interdata" -> "Unix/TS 3.0";  
    "Interdata" -> "PWB 2.0";  
    "Interdata" -> "7th Edition";  
    "7th Edition" -> "8th Edition";
```



graphviz.org

# Decision table

see also: Fowler, chapter 48

Programs describe choices (essentially, a bit-vector)

**Example: pricing**

13-inch MacBook Pro with Retina display

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① Choose Processor  
[Which processor is right for you?](#)

2.7GHz Dual-core Intel Core i5, Turbo Boost up to 3.1GHz	
2.9GHz Dual-core Intel Core i5, Turbo Boost up to 3.3GHz	+ \$100.00
3.1GHz Dual-core Intel Core i7, Turbo Boost up to 3.4GHz	+ \$300.00

② Choose Memory  
[How much memory is right for you?](#)

8GB 1866MHz LPDDR3 SDRAM	
16GB 1866MHz LPDDR3 SDRAM	+ \$200.00

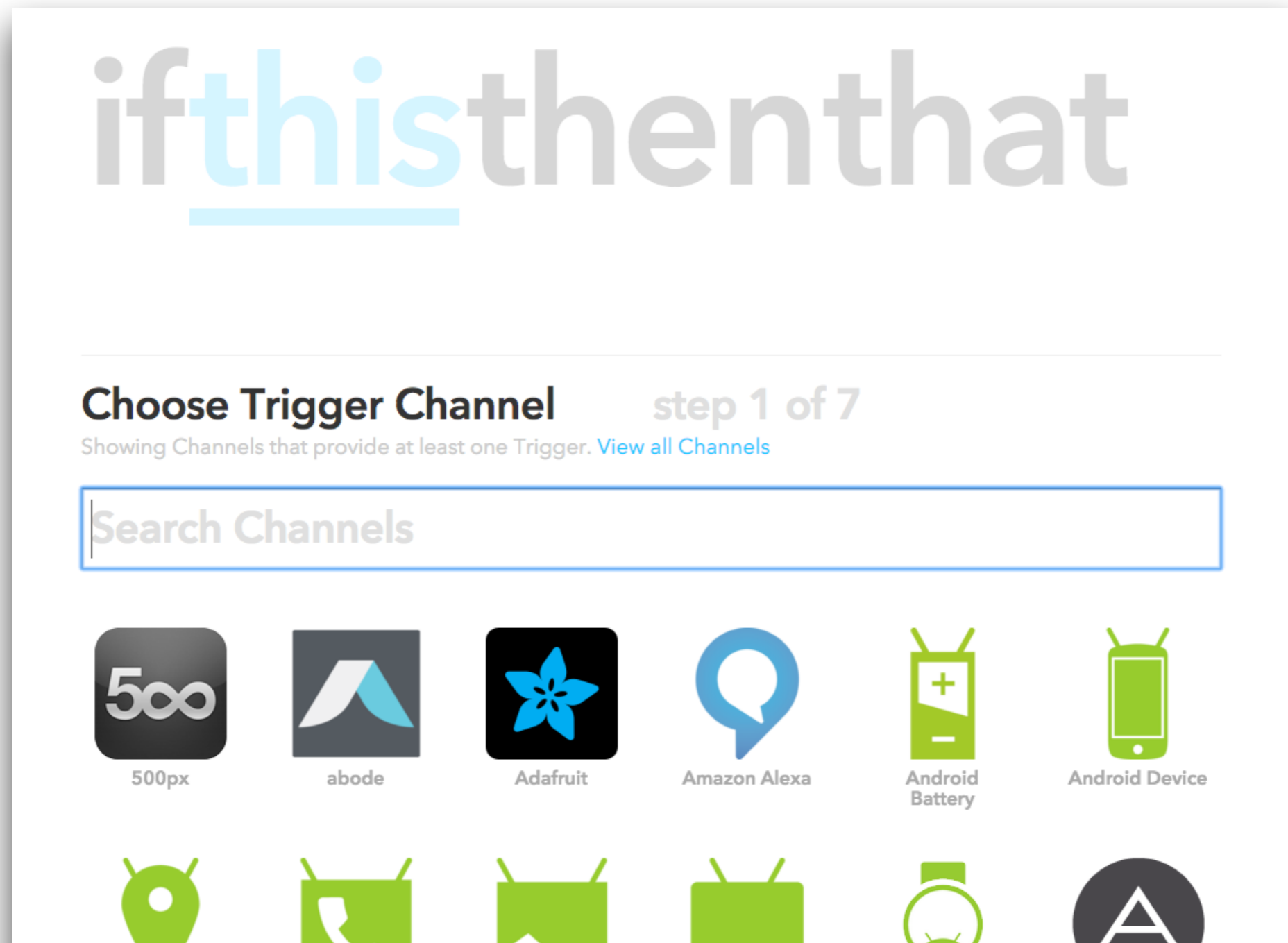
③ Add Keyboard and Documentation

# Production rule

see also: Fowler, chapter 50

Programs describe conditions + actions

**Example: IFTTT**



The screenshot shows the IFTTT website interface. At the top, the logo "iftthisthenthat" is displayed, with "ift" in grey, "this" in blue and underlined, and "thenthat" in grey. Below the logo is a horizontal line. Underneath the line, the text "Choose Trigger Channel" is followed by "step 1 of 7" in a smaller font. Below this, a subtitle reads "Showing Channels that provide at least one Trigger. [View all Channels](#)". A search bar with the placeholder text "Search Channels" is positioned below the subtitle. Below the search bar, a grid of channel icons is shown. The first row includes icons for 500px, abode, Adafruit, Amazon Alexa, Android Battery, and Android Device. The second row shows icons for a location pin, a smartphone, another smartphone, another smartphone, a smartwatch, and a stylized 'A' logo. The website URL "ifttt.com" is visible in the bottom right corner.

iftthisthenthat

Choose Trigger Channel step 1 of 7

Showing Channels that provide at least one Trigger. [View all Channels](#)

Search Channels

500px abode Adafruit Amazon Alexa Android Battery Android Device

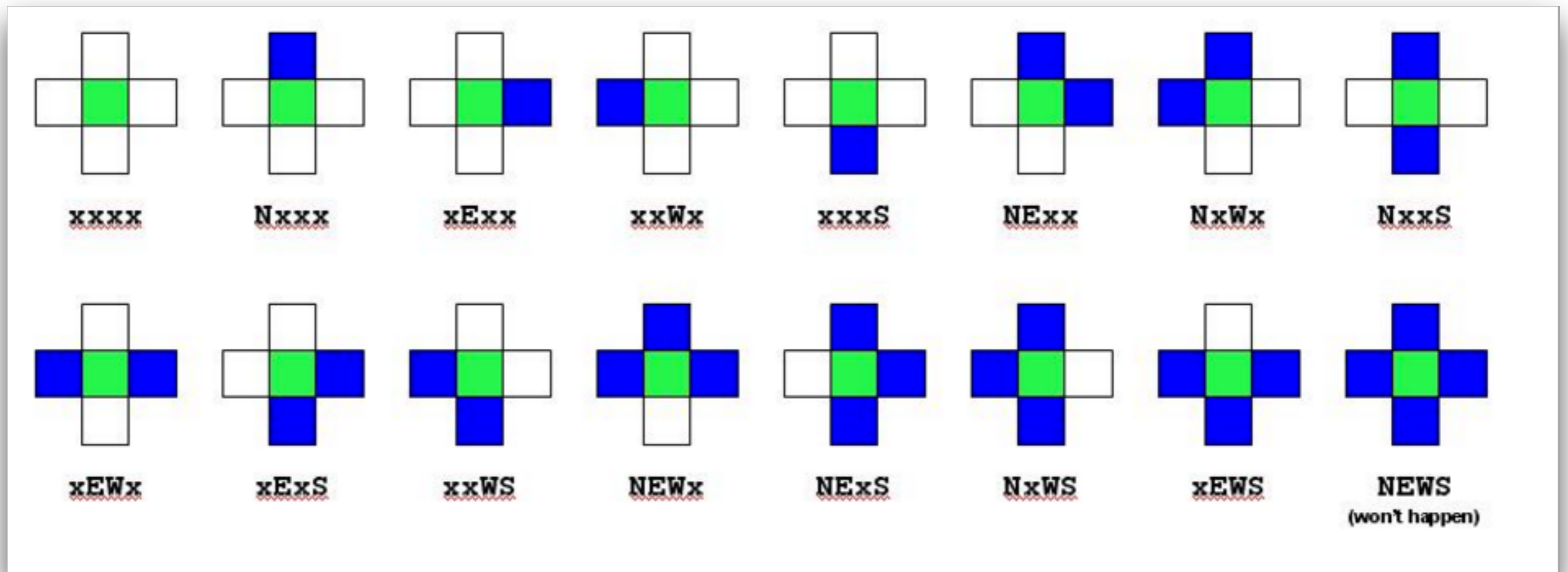
ifttt.com

# State machine

see also: Fowler, chapter 51

Programs describe states + transitions

**Example: Picobot's syntax**



# Dependence graph

see also: Fowler, chapter 49

Programs describe a network of dependences (partial order)

**Example: make**

```
all: $(TARGETS)
```

```
stringtest: $(STRINGTEST_OBJS)
```

```
$(CXX) $(LDFLAGS) $(LIBS) $(CXXFLAGS) -o $@ $(STRINGTEST_OBJS)
```

```
clean:
```

```
rm -f $(TARGETS) $(ALL_OBJS)
```

```
string-wrapper.o: string-wrapper.cpp string-wrapper.hpp upointer.hpp \  
upointer-private.hpp
```

```
stringtest.o: stringtest.cpp string-wrapper.hpp upointer.hpp \  
upointer-private.hpp
```

# Constraint satisfaction

Programs describe (properties of) the solution

**Example: SQL**

```
from Employee e  
left join fetch e.department  
where e.salary > :limit
```

# Computational models

**Data interpretation:** programs describe input

e.g., graphviz

**Decision table:** programs describe choices

e.g., pricing

**Production rule:** programs describe conditions & actions

e.g., IFTTT

**State machine:** programs describe states & transitions

e.g., Picobot syntax

**Dependence graph:** programs describe a partial order

e.g., make

**Constraint satisfaction:** programs describe the solution

e.g., SQL