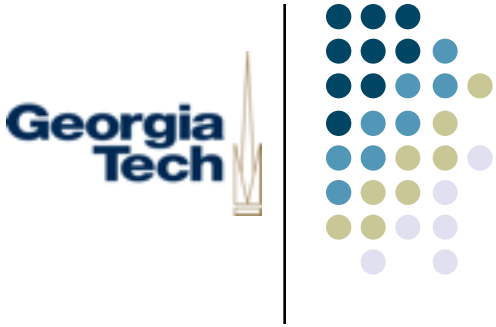
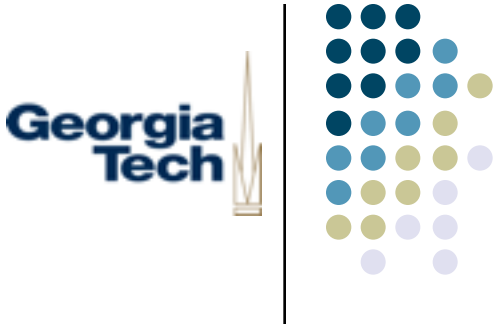
Using Regular Expressions



What are "Regular Expressions?"

- Power text-matching tools
- Let you search strings for patterns; manipulate or chop up strings based on patterns
  - Patterns can be based on "normal" characters (e.g., the alphabet)
  - Can also include "special" symbols that give more expressive power
    - Match only numbers
    - Match only letters
    - Require that a string have zero or more (or one or more, or ...) occurrences of a given pattern before it counts as a match
    - Require that a string have a certain pattern at the beginning, or the end, of it in order for it to match

Understanding Regular Expressions



- You define a *pattern* string that can contain normal characters as well as characters that represent special conditions like the ones on the earlier slide
- Test this against a *target* string to determine if the pattern *matches* that string
  - Meaning: that the pattern, including any special conditions, exists in that target string
  - Normal characters must match exactly
  - Special characters let you make the match more flexible

Regular Expressions in Python

- Use the "re" module:
  - import re
- Most important methods:
  - search(pattern, string)
    - Tests to see if the pattern matches anywhere in the target string; returns a MatchObject corresponding to the first one found
  - split(pattern, string)
    - Breaks apart the string by finding occurrences of the pattern (in other words, treating the pattern as the delimiter). Matched pattern elements are *not* returned in the strings

Examples

```
import re
str = "Hello, Allan"
match = re.search("ll", str)
```

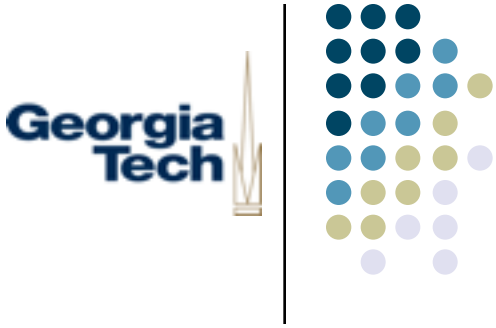
- match.start() - returns 2, the index of the start of where the pattern occurs
- match.end() - returns 4, the index of the end of where the pattern occurs

- To search for the next occurrence, one easy way is use the returned indices to create a substring of the original string that excludes the matched part:
  - substr = str[4:]
  - *substr* now refers to a string containing all the characters after index 4 ("o, Allan") which can be searched again to find the next occurrence of the pattern

More Examples

str = “Hello, Allan”

re.split(“ll”, str) - returns [‘He’, ‘o, A’, ‘an’]



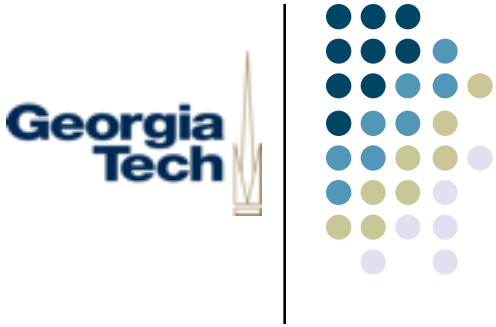
Special Characters

- Backslashes are frequently used in regular expression patterns
- ... but the backslash character itself has special meaning in Python, so normally you'd have to put *another* backslash in front of it
  - Results in really unreadable patterns!
- Alternative: use Python "raw" strings:
  - Preface string with lowercase *r*
  - Lets you get away without the extra backslash
  - Example: r'\w\w'

Special Characters

. (a single period)	Matches any character except a newline
^ or \A	Limits the match to occur at the beginning of the string
$ or \Z	Limits the match to occur at the end of the string
* (asterisk)	Matches zero or more of the preceding character. Example: s* means zero or more of the letter “s”
+ (plus)	Matches one or more of the preceding character
[ ]	Defines a character set. For example, to match against *any* of the vowels, use [aeiou]. To match against any number of numerals, use [0123456789-*
\s	Matches any whitespace character (space, tab, newline)
\n	Matches newline
\w	Matches any alphabetic or numeric character. Equivalent to [a-zA-Z0-9]

Resources, Tutorials, and Examples



- http://www.amk.ca/python/howto/regex/
- http://diveintopython.org/regular_expressions/index.html
- http://www.deitel.com/articles/internet_web_tutorials/20060225/PythonStringProcessing/index.html
- http://www.regular-expressions.info/python.html