



Project 3
due March 14th

Project 3 uses

- Google Web API
 - allows programs to make Google queries
- GJ
- Design patterns

Google Web APIs



- Information and download at:
 - <http://www.google.com/apis/>
- You will need a Google account to make Google queries
 - register at the above URL
 - we will provide a dummy implementation if you don't want to do this
 - Only 1000 queries per day

GoogleSearchResultElement

- Selected methods:

```
public java.lang.String getURL();
public java.lang.String getTitle();
public java.lang.String getSnippet();
public java.lang.String getDirectoryTitle();
public java.lang.String getSummary();
public java.lang.String getHostName();
```

GoogleMap

- implements `Map<String, Iterator<GoogleSearchResultElement>>`
- Properties:
 - read-only
 - can't enumerate keys or search for values
 - Singleton

Sort of a hack

- It is sort of a hack to write a Map adaptor for the Google APIs
- But there is no standard Function interface
- Allows passing of GoogleMap to code that expects a Map
- Won't work if code tries to enumerate the keys of the Map

Lazy Google queries

- A normal google query only returns at most 10 elements at a time
 - don't change this
- Iterator might be used to enumerate 1, 5, 15 or 50 elements
- Cache google query results
 - make new request when you need the next 10 elements

LazyList<Value>

- implements `List<Value>`
- has a `LazyList(Iterator<Value> i)` constructor
- Implements at least:
 - `Value get(int pos)`
 - `Iterator<Value> iterator()`
- Can throw `UnsupportedOperationException` for others

LazyList behavior

- Iterator passed to constructor is base iterator
- May not request any elements from base iterator unless element is required for operation on LazyList

CachedGoogleMap

- implements
Map<String,
Iterator<GoogleSearchResultElement> >
- Same behavior as CachedGoogleMap
- But caches/shares results from previous operations
 - using a LazyList
- Implementation hint:
 - use a Map<String,
LazyList<GoogleSearchResultElement> >

Project rules

- Expect Generic Polymorphism to be used
- No warnings from GJ compiler
- No casts or instanceof in source code

Some cases to check

- Queries that only return a small number of pages
 - e.g., asdfghjklqwert
- Queries that return no pages
 - e.g., qazwsxedcrfvtgb12