



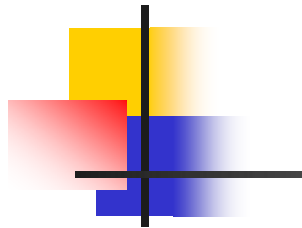
Cloud Computing for the Humanities

Graham Wilcock
University of Helsinki



What is Cloud Computing?

- "Run your app in the cloud"
 - Using somebody else's computers
- Computing resources on-demand
 - Like electricity, or pizza delivery
- Platform-as-a-Service (PaaS)
 - Example: Google App Engine



Google App Engine - Google Code - Mozilla Firefox

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http://code.google.com/appengine/

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e.g. "templates" or "datastore"

Google App Engine


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Run your web apps on Google's infrastructure.

Easy to build, easy to maintain, easy to scale.

Google App Engine enables you to build and host web apps on the same systems that power Google applications. App Engine offers fast development and deployment; simple administration, with no need to worry about hardware, patches or backups; and effortless scalability. [Discover why](#) developers are choosing App Engine.



Google App Engine for Business ^{New!}

Run your enterprise applications on Google's infrastructure.

- **Centralized administration:** A new, company-focused administration console lets you manage all the applications in your domain.
- **Reliability and support:** 99.9% uptime service level agreement, with premium developer support available.
- **Secure by default:** Only users from your [Google Apps](#) domain can access applications by default.
- **Pricing that makes sense:** Each application costs just \$8 per user, per month up to a maximum of \$1000

Getting Started

1. [Sign up](#) for an App Engine account.
2. [Download](#) the App Engine SDK.
3. Read the [Getting Started Guide](#).

Watch and Learn



Developing and deploying on Google App Engine. [Watch Now](#)

links from AppEngine.reddit.com

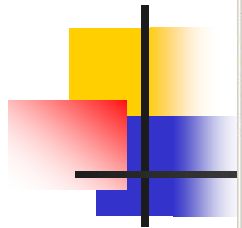
- ↑ Controlling an EC2 instance using App Engine
3 points | [1 comment](#)
- ↑ Modeling relationships in App Engine - Nick's Blog
2 points | [comment](#)
- ↑ Manipulate AppEngine datastore from the Python interactive console
7 points | [1 comment](#)

Done



Google App Engine

- "Run your web apps on Google's infrastructure"
 - <http://your-app-name.appspot.com>
- My web app is AELRED:
 - *App Engine Language Resource Editions*
 - First version: Jane Austen novels
 - <http://aelred-austen.appspot.com>



AELRED Austen - Mozilla Firefox

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http://aelred-austen.appspot.com/ cloud computing

AELRED Austen

App Engine Language Resource Editions

This web application demonstrates the use of natural language processing in a cloud computing environment. AELRED serves up English literary texts with a range of optional linguistic annotations including word frequencies, concordances, part-of-speech tagging, shallow parsing, and word sense definitions.

AELRED runs on the [Google App Engine](#) cloud computing framework. The raw texts (prior to being annotated) are the plain texts made available by [Project Gutenberg](#). The annotations are created automatically by natural language processing techniques. Where possible, existing tools from [NLTK Natural Language Toolkit](#) are used. Word sense definitions are from [WordNet](#).

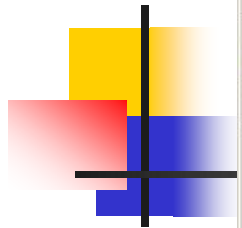
In this initial demonstration version, the texts are the six completed novels of Jane Austen. The total number of words is about half a million. Click on the Jane Austen button below to continue.

Graham Wilcock

Available Authors

Jane Austen

Done



AELRED Austen - Mozilla Firefox

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http://aelred-austen.appspot.com/Austen

cloud computing


AELRED Austen

App Engine Language Resource Editions

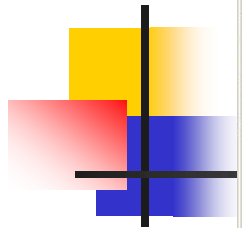
Jane Austen

Available Books

- Sense and Sensibility (Published 1811)
- Pride and Prejudice (Published 1813)
- Mansfield Park (Published 1814)
- Emma (Published 1816)
- Persuasion (Published 1818)
- Northanger Abbey (Published 1818)



Done



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AELRED Austen

App Engine Language Resource Editions

Jane Austen: Northanger Abbey

List of Chapters

Chapter 1 No one who had ever seen Catherine Morland in her infancy would have supposed her born to be an heroine. Her situation in life, the character of ...

Chapter 2 In addition to what has been already said of Catherine Morland's personal and mental endowments, when about to be launched into all the difficult...

Chapter 3 Every morning now brought its regular duties--shops were to be visited; some new part of the town to be looked at; and the pump-room to be attende...

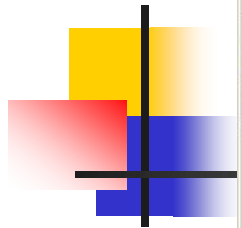
Chapter 4 With more than usual eagerness did Catherine hasten to the pump-room the next day, secure within herself of seeing Mr. Tilney there before the mor...

Chapter 5 Catherine was not so much engaged at the theatre that evening, in returning the nods and smiles of Miss Thorpe, though they certainly claimed much...

Chapter 6 The following conversation, which took place between the two friends in the pump-room one morning, after an acquaintance of eight or nine days, is...

Chapter 7 Half a minute conducted them through the pump-yard to the archway, opposite Union Passage; but here they were stopped. Everybody acquainted with ...

Done



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AELED Austen

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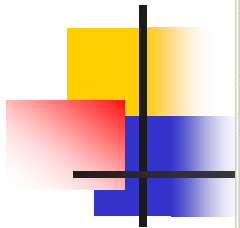
Jane Austen: Northanger Abbey: Chapter 1

Tokenized Text Part-of-Speech Tags Phrase Chunks
 Word Frequencies Concordances WordNet Definitions

CHAPTER 1

No one who had ever seen Catherine Morland in her infancy would have supposed her born to be an heroine . Her situation in life , the character of her father and mother , her own person and disposition , were all equally against her . Her father was a clergyman , without being neglected , or poor , and a very respectable man , though his name was Richard -- and he had never been handsome . He had a considerable independence besides two good livings -- and he was not in the least addicted to locking up his daughters . Her mother was a woman of useful plain sense , with a good temper , and , what is more remarkable , with a good constitution . She had three sons before Catherine was born ; and instead of dying in bringing the latter into the world , as anybody might expect , she still lived on -- lived to have six children more -- to see them growing up around her , and to enjoy excellent health herself . A family of ten children will be always called a fine family , where there are heads and arms and legs enough for the number ; but the Morlands had little other right to the word , for they were in general very plain , and Catherine , for many years of her life , as plain as any . She had a thin awkward figure , a sallow skin without colour , dark lank hair , and strong features -- so much for her person ; and not less unpropitious for heroism seemed her mind . She was fond of all boy 's plays , and greatly preferred cricket not merely to dolls , but to the more heroic enjoyments of infancy , nursing a dormouse , feeding a canary-bird , or

Done



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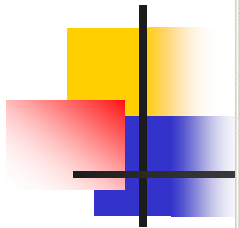
Jane Austen: Northanger Abbey: Chapter 1

Tokenized Text Part-of-Speech Tags Phrase Chunks
 Word Frequencies Concordances WordNet Definitions

CHAPTER/NN 1/CD

No/DT one/NN who/WP had/VBD ever/RB seen/VBN Catherine/NNP Morland/NNP in/IN her/PRP\$ infancy/NN would/MD have/VB supposed/VBN her/PRP\$ born/NN to/TO be/VB an/DT heroine/NN ./. Her/PRP\$ situation/NN in/IN life/NN ,/, the/DT character/NN of/IN her/PRP\$ father/NN and/CC mother/NN ,/, her/PRP\$ own/JJ person/NN and/CC disposition/NN ,/, were/VBD all/DT equally/RB against/IN her/PRP\$./. Her/PRP\$ father/NN was/VBD a/DT clergyman/NN ,/, without/IN being/VBG neglected/VBN ,/, or/CC poor/JJ ,/, and/CC a/DT very/RB respectable/JJ man/NN ,/, though/IN his/PRP\$ name/NN was/VBD Richard/NNP --/: and/CC he/PRP\$ had/VBD never/RB been/VBN handsome/JJ ./. He/PRP\$ had/VBD a/DT considerable/JJ independence/NN besides/VBZ two/CD good/JJ livings/NNS --/: and/CC he/PRP\$ was/VBD not/RB in/IN the/DT least/JJS addicted/VBN to/TO locking/NN up/IN his/PRP\$ daughters/NNS ./. Her/PRP\$ mother/NN was/VBD a/DT woman/NN of/IN useful/JJ plain/NN sense/NN ,/, with/IN a/DT good/JJ temper/NN ,/, and/CC ,/, what/WP is/VBZ more/RBR remarkable/JJ ,/, with/IN a/DT good/JJ constitution/NN ./. She/PRP\$ had/VBD three/CD sons/NNS before/IN Catherine/NNP was/VBD born/VBN ;/: and/CC instead/RB of/IN dying/VBG in/IN bringing/NN the/DT latter/NN into/IN the/DT world/NN ,/, as/IN anybody/NN might/MD expect/VB ,/, she/PRP\$ still/RB lived/VBD on/IN --/: lived/VBN to/TO have/VB six/CD children/NNS more/JJR --/: to/TO see/VB them/PRP\$ growing/VBG up/RP around/IN

Done



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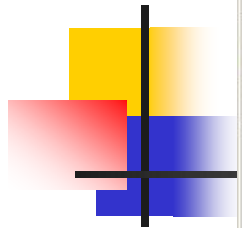
Jane Austen: Northanger Abbey: Chapter 1

Tokenized Text Part-of-Speech Tags Phrase Chunks
 Word Frequencies Concordances WordNet Definitions

CHAPTER/NN 1/CD

No/DT one NN: Noun, singular or mass er/RB seen/VBN Catherine/NNP Morland/NNP in/IN her/PRP\$ infancy/NN would/MD have/VB supposed/VBN her/PRP\$ born/NN to/TO be/VB an/DT heroine/NN ./. Her/PRP\$ situation/NN in/IN life/NN ,/, the/DT character/NN of/IN her/PRP\$ father/NN and/CC mother/NN ,/, her/PRP\$ own/JJ person/NN and/CC disposition/NN ,/, were/VBD all/DT equally/RB against/IN her/PRP\$./. Her/PRP\$ father/NN was/VBD a/DT clergyman/NN ,/, without/IN being/VBG neglected/VBN ,/, or/CC poor/JJ ,/, and/CC a/DT very/RB respectable/JJ man/NN ,/, though/IN his/PRP\$ name/NN was/VBD Richard/NNP --/: and/CC he/PRP\$ had/VBD never/RB been/VBN handsome/JJ ./. He/PRP\$ had/VBD a/DT considerable/JJ independence/NN besides/VBZ two/CD good/JJ livings/NNS --/: and/CC he/PRP\$ was/VBD not/RB in/IN the/DT least/JJS addicted/VBN to/TO locking/NN up/IN his/PRP\$ daughters/NNS ./. Her/PRP\$ mother/NN was/VBD a/DT woman/NN of/IN useful/JJ plain/NN sense/NN ,/, with/IN a/DT good/JJ temper/NN ,/, and/CC ,/, what/WP is/VBZ more/RBR remarkable/JJ ,/, with/IN a/DT good/JJ constitution/NN ./. She/PRP\$ had/VBD three/CD sons/NNS before/IN Catherine/NNP was/VBD born/VBN ;/: and/CC instead/RB of/IN dying/VBG in/IN bringing/NN the/DT latter/NN into/IN the/DT world/NN ,/, as/IN anybody/NN might/MD expect/VB ,/, she/PRP\$ still/RB lived/VBD on/IN --/: lived/VBN to/TO have/VB six/CD children/NNS more/JJR --/: to/TO see/VB them/PRP\$ growing/VBG up/RP around/IN

Done



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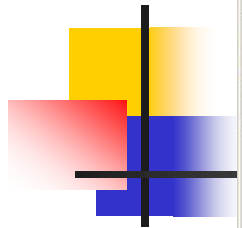
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Done



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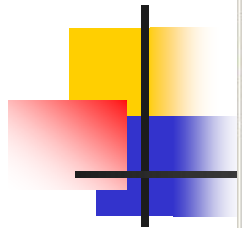
App Engine Language Resource Editions

Jane Austen: Northanger Abbey: Chapter 1

Tokenized Text Part-of-Speech Tags Phrase Chunks
 Word Frequencies Concordances WordNet Definitions

1 1 Allen 1 Bath 1 Beggar 1 CHAPTER 1 **Catherine** 10 England 1 French 1 Friends 1 Fullerton 1 Gray
1 Grief 1 Hare 1 Holy 1 Miss 1 **Morland** 6 **Morlands** 2 **Mr** 2 **Mrs** 3 Patience 1 Petition 1 Pope 1 Richard 1 Sally
1 Shakespeare 1 Smiling 1 Thompson 1 Trifles 1 Wiltshire 1 Writ 1 Writing 1 abilities 1 abroad 1 accidentally 1 accomplished 1
accounted 1 accounts 1 acquaintance 1 acquisition 1 addicted 1 admiration 1 adventures 1 **age** 2 **air** 2 allowed 1 amiable 1
animation 1 appearances 1 arms 1 attempt 1 aware 1 awkward 1 back 1 **bad** 2 balls 1 baronet 1 baseball 1 **bear** 2 beauty 1
beetle 1 befall 1 **began** 2 benefit 1 blush 1 **books** 3 **born** 3 **boy** 2 bringing 1 brought 1 call 1 called 1 canary-bird 1
caught 1 censure 1 chance 1 **character** 2 chickens 1 chief 1 chiefly 1 **children** 4 clean 1 cleanliness 1 clergyman 1
colour 2 complexion 1 compliance 1 composition 1 confinement 1 confirmation 1 conjectured 1 consequence 1 considerable 1
constitution 2 corporal 1 country 1 cradle 1 **cricket** 2 curl 1 dark 1 **daughters** 3 day 1 deficiency 1 delight 1 delightful
1 desert 1 design 1 detected 1 dies 1 dirt 1 dismissed 1 disposition 1 distaste 1 dolls 1 door 1 dormouse 1 **drawing** 3
dying 1 ears 1 elder 1 enjoy 1 enjoyments 1 equally 1 eventful 1 exceedingly 1 excellent 1 excited 1 expect 1 extraordinary 1
eyes 1 fable 1 fairly 1 families 1 **family** 3 **father** 5 fatigue 1 **features** 2 feeding 1 feels 1 fell 1 **fifteen** 3
figure 2 fine 1 finery 1 flower 1 flowers 1 **fond** 3 forbidden 1 forlorn 1 forty 1 found 1 fourteen 1 fragrance 1 **gained** 3
garden 1 gathered 1 gave 1 general 1 generally 1 giant 1 **girl** 3 **good** 4 good-humoured 1 good-looking 1 gouty 1 **great**

Done



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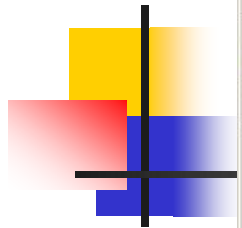
Jane Austen: Northanger Abbey: Chapter 1

Tokenized Text Part-of-Speech Tags Phrase Chunks
 Word Frequencies Concordances WordNet Definitions

[CHAPTER 1](#)

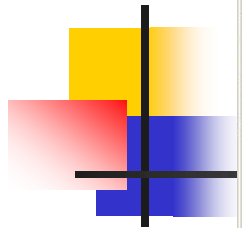
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Done



Tokenized Text
 Part-of-Speech Tags
 Phrase Chunks
 Word Frequencies
 Concordances
 WordNet Definitions

Left Context	Word	Right Context
uld have supposed her born to be an	heroine	. Her situation in life , the chara
seventeen she was in training for a	heroine	; she read all such works as heroin
. But when a young lady is to be a	heroine	, the perverseness of forty surroun
ons which the first separation of a	heroine	from her family ought always to exc
ess delight in being fine ; and our	heroine	's entree into life could not take
omfort ; and now was the time for a	heroine	, who had not yet played a very dis
s simple praise than a true-quality	heroine	would have been for fifteen sonnets
fortune was more favourable to our	heroine	. The master of the ceremonies intr
itting them to be read by their own	heroine	, who , if she accidentally take up
id pages with disgust . Alas If the	heroine	of one novel be not patronized by t
one novel be not patronized by the	heroine	of another , from whom can she expe
nces which peculiarly belong to the	heroine	's life , and her fortitude under i
. Every young lady may feel for my	heroine	in this critical moment . for every



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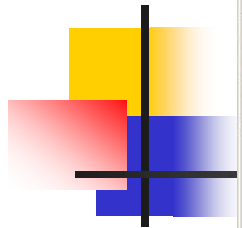
Jane Austen: Northanger Abbey: Chapter 1

Tokenized Text Part-of-Speech Tags Phrase Chunks
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CHAPTER 1

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AELRED Austen

App Engine Language Resource Editions

Jane Austen: Northanger Abbey: Chapter 1

Tokenized Text Part-of-Speech Tags Phrase Chunks
 Word Frequencies Concordances WordNet Definitions

CHAPTER 1

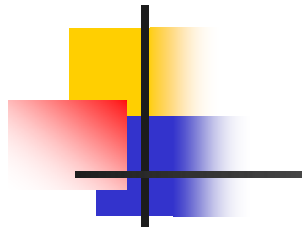
No one who had ever seen Catherine Morland in her infancy would have supposed her born to be an heroine . Her situation in life , the character of her father and mother , her own person and disposition , and the smallness of her fortune , all conspired to make her a heroine , without being neglected , or poor , and a very respectable man , enough to make her a heroine . He was Richard -- and he had never been handsome . He had a considerable independence besides two good livings -- and he was not in the least addicted to locking up his daughters . Her mother was a woman of useful plain sense , with a good temper , and , what is more remarkable , with a good constitution . She had three sons before Catherine was born ; and instead of dying in bringing the latter into the world , as anybody might expect , she still lived on -- lived to have six children more -- to see them growing up around her , and to enjoy excellent health herself . A family of ten children will be always called a fine family , where there are heads and arms and legs enough for the number ; but the Morlands had little other right to the word , for they were in general very plain , and Catherine , for many years of her life , as plain as any . She had a thin awkward figure , a sallow skin without colour , dark lank hair , and strong features -- so much for her person ; and not less unpropitious for heroism seemed her mind . She was fond of all boy 's plays , and greatly preferred cricket not merely to dolls , but to the more heroic enjoyments of infancy , nursing a dormouse , feeding a canary-bird , or

Done



Key Ideas: Easy, Big, Free

- Easy: use Python
 - NLTK Natural Language Toolkit
 - Django HTML Template Engine
- Big: Google's scalable infrastructure
 - BigTable non-relational datastore
 - MapReduce data-intensive processing
- Free: App Engine has free quotas
 - Only pay if high demand for app



Natural Language Toolkit - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.nltk.org/

Natural Language Toolkit

Natural Language Toolkit

Search this site

Navigation

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Feedback

NLTK Home

Open source Python modules, linguistic data and documentation for research and development in natural language processing and text analytics, with distributions for Windows, Mac OSX and Linux.

- [News](#) - Version 2.0b9 released [July 2010], Version 2.0b8 included in Ubuntu 10.4 [February 2010], NLTK book in second printing, with revisions [December 2009]
- [Code](#) - functionality provided by NLTK in over 100,000 lines of Python code, distributed under the Apache License
- [Data](#) - ~60 corpora, grammar collections, and trained models that come with NLTK
- [Quotes](#) - what people have said about NLTK

Getting Started

- [Documentation](#) - book, articles, guides, reviews
- [Download](#) - instructions for downloading and installing Python and NLTK on all platforms
- [Getting Started](#) - simple things to try, including NLTK's demonstrations
- [Subscribe](#) - sign up for important announcements - approx 1 post per month

Getting Help

- [FAQ](#) - answers to frequently asked questions
- [HOWTO](#) - guides for a variety of NLTK packages, including many examples
- [User forum](#) - mailing list for discussion amongst NLTK users
- Chatroom - #nltk on irc.freenode.net (not often staffed)

Software

- [API Documentation](#) - complete documentation of all NLTK modules
- [Source](#) - browse the Python source code
- [Google Code](#) - the home of the NLTK development work (submit a feature request or bug report)
- [People](#) - the NLTK development team

Done



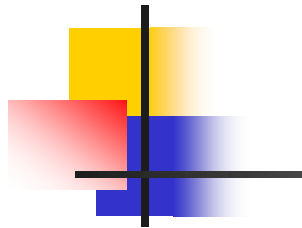
NLTK Natural Language Toolkit

- Open source Python tools
 - Taggers, chunkers, parsers, classifiers ...
- Many major corpora and resources
 - Brown Corpus, Penn Treebank, WordNet ...
- Excellent free online textbook
 - *Natural Language Processing with Python*
 - Stephen Bird, Ewan Klein, Edward Loper



NLTK and App Engine

- App Engine code must be pure Python
- Normal "import nltk" does not work
 - Some NLTK code is not pure Python
 - E.g. uses Numpy with C for speed
- Use "import aelred" instead
 - Aelred code is pure Python
 - Other customization, e.g. tokenization



The screenshot shows the Django website in a Mozilla Firefox browser window. The browser's address bar displays the URL `http://www.djangoproject.com/`. The website's header features the Django logo and a navigation menu with links for Home, Download, Documentation, Weblog, Community, and Code. Below the header, a green banner contains the tagline: "The Web framework for perfectionists with deadlines. Django makes it easier to build better Web apps more quickly and with less code."

The main content area is divided into three columns:

- Meet Django:** A section describing Django as a high-level Python Web framework that encourages rapid development and clean, pragmatic design. It mentions that Django was developed by a fast-moving online-news operation and focuses on automating as much as possible, adhering to the [DRY principle](#). It also provides links for [reading the overview](#) and [installation guide and tutorial](#).
- Download:** A section highlighting the latest release, **1.2.3**, and providing links for [Open source, BSD license](#), [Documentation](#), [Installation guide](#), [Tutorial](#), and [Full index...](#)
- Weblog:** A section listing recent news items, including [Django 1.3 release schedule](#) by Russell Keith-Magee on Sep. 30, 2010, [Django 1.2.3 released](#) by James Bennett on Sep. 10, 2010, and [Security release issued](#) by James Bennett on Sep. 8, 2010.

At the bottom of the page, there is a section titled "The Django framework" with a sub-section for "Object-relational mapper" and a link to "EveryBlock".



Django Web App Framework

- Open source Python
 - Model-View-Controller design pattern
 - Models defined easily by Python classes
- HTML Template Engine
 - Web pages generated using contexts
 - Excellent "template inheritance" facility
- Free online textbook
 - *Django: The Book*



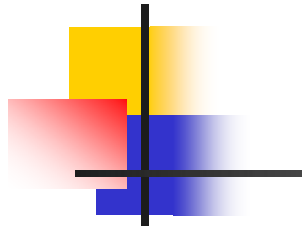
Google BigTable Datastore

- Non-relational database
 - Different thinking from SQL databases
 - Designed for massive scalability
- My current way of using the datastore:
 - Serialize complex objects to YAML
 - Store/retrieve YAML as big text strings



MapReduce Algorithms

- Data-intensive distributed processing
 - Different thinking from usual algorithms
 - Designed for massive scalability
- My current way of using MapReduce:
 - Iterate over all entities in datastore
 - Delete entity, or update and save



Google Research Publication: MapReduce - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://labs.google.com/papers/mapreduce.html

Google Research Publication: MapRe...

Google Research Publications [Google Labs Home](#)

MapReduce: Simplified Data Processing on Large Clusters

[Jeffrey Dean](#) and [Sanjay Ghemawat](#)

Abstract

MapReduce is a programming model and an associated implementation for processing and generating large data sets. Users specify a map function that processes a key/value pair to generate a set of intermediate key/value pairs, and a reduce function that merges all intermediate values associated with the same intermediate key. Many real world tasks are expressible in this model, as shown in the paper.

Programs written in this functional style are automatically parallelized and executed on a large cluster of commodity machines. The run-time system takes care of the details of partitioning the input data, scheduling the program's execution across a set of machines, handling machine failures, and managing the required inter-machine communication. This allows programmers without any experience with parallel and distributed systems to easily utilize the resources of a large distributed system.

Our implementation of MapReduce runs on a large cluster of commodity machines and is highly scalable: a typical MapReduce computation processes many terabytes of data on thousands of machines. Programmers find the system easy to use: hundreds of MapReduce programs have been implemented and upwards of one thousand MapReduce jobs are executed on Google's clusters every day.

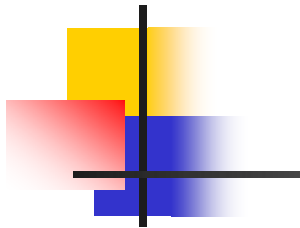
Appeared in:
OSDI'04: Sixth Symposium on Operating System Design and Implementation,
San Francisco, CA, December, 2004.

Download: [PDF Version](#)

Slides: [HTML Slides](#)

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Done



The screenshot shows a Mozilla Firefox browser window displaying the Google Code project page for 'appengine-mapreduce'. The browser's address bar shows the URL 'http://code.google.com/p/appengine-mapreduce/'. The page features a navigation menu with tabs for 'Project Home', 'Downloads', 'Wiki', 'Issues', and 'Source'. The main content area is divided into sections: 'Overview', 'Status', 'Getting Started', and 'Screenshots'. The 'Overview' section describes the library as an open-source tool for MapReduce-style computations on the Google App Engine platform. The 'Status' section notes it is an early experimental release. The 'Getting Started' section provides links to documentation for Python and Java. The 'Screenshots' section mentions a UI for managing mapper execution. On the right side, there is a sidebar with project metadata: 'Activity: High', 'Code license: Apache License 2.0', 'Labels: google, appengine, mapreduce', 'Featured wiki pages: GettingStartedInJava, GettingStartedInPython', 'Feeds: Project feeds', and 'Owners: mike.aizatsky, bslatkin, fewstore, nick.joh...@google.com, troy.trimble, f...@google.com, i...@google.com, appengine-mirrorbot, rudomi...@google.com, bquin...@google.com'. A 'People details' link is also present.

