

# MIGRATING GOOGLE CLOUD SDK TO THE CLOUD

## CASE STUDY: GAE LAUNCHER

Orges Cico 1   Zamir Dika 2   Betim Cico 3   Kozeta Sevrani 1

<sup>1</sup>Faculty of Economy,  
University of Tirana,  
Tirana, Albania

<sup>2</sup>South East European University,  
Tetovo, Macedonia

<sup>3</sup>Computer Engineering Department,  
Epoka University, Tirana, Albania

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# Outline

- 1 Background
  - Cloud SDK and IDE Tools
  - IDE Tools
- 2 State of the Art
  - Related Work
- 3 Methodology
  - Cloud IDEaaS - Serving purpose and proposed model (I)
  - Cloud IDEaaS - Serving purpose and proposed model (II)
  - Cloud SDK part of the SaaS
  - IDEaaS cloud layer
- 4 Case Study: GAE Launcher
  - Migrating Google Cloud SDK
  - IDE Features and Development
- 5 Business models
  - Pay as you go Coding (PaygoC)
  - On Demand Coding (ODC)
- 6 Conclusions

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- Role
  - SDK commonly represents a set of tools for Cloud Platforms
  - CLI (Command Line Interface)
  - GUI (Graphical User Interface)
- Supported Programming Languages

Cloud Provider	Denomination	PaaS Supported Programming Languages
Google	Google App Engine	Go, PHP, Java, Python, Node, .NET, Ruby
Amazon	AWS Elastic Beabstalk	Java, .NET, PHP, Node.js, Python, Ruby, Go, Dockers
Microsoft	Azure Cloud	Java, .NET, PHP, Node.js, Python,

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- Google Cloud
  - JetBrains (Pycharm)
  - StackDriver
- Amazon Cloud
  - Amazon Web Service
- Azure Cloud
  - Visual Studio
  - KUDU

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## Related Work

(J. Hausladen et al. 2014)

(L. Wu et al. 2011)

## Existing Online IDE Solutions

Cloud 9 launched in 2012

Condevy Founded in 2010

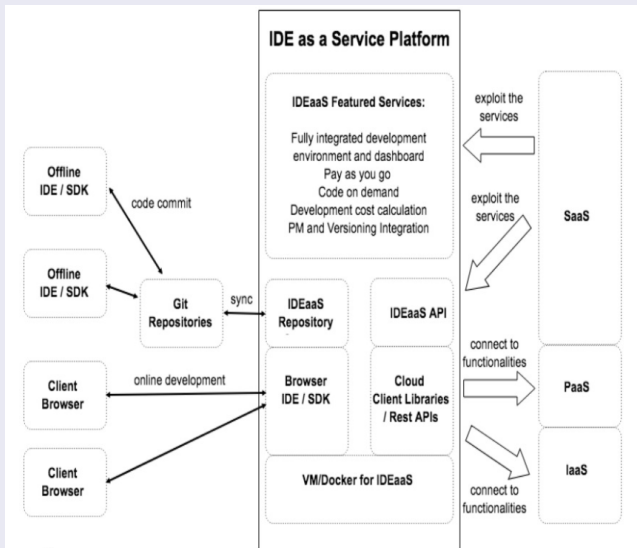


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# Cloud IDEaaS - Serving purpose and proposed model (I)

## Integrated Development Environment as a Service - Platform



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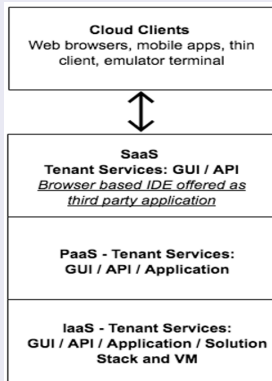
## Expected Features

- 1 Browser based SDK fully integrated with the different service layers (PaaS, IaaS) and their REST API-s or client libraries
- 2 Browser based IDE encapsulating the SDK functionalities within the platform
- 3 Development tool that fully exploits the pay per use or pay as you go model
- 4 Coding Synchronization through Versioning or Agile Environments(GitHub, Jira etc.)

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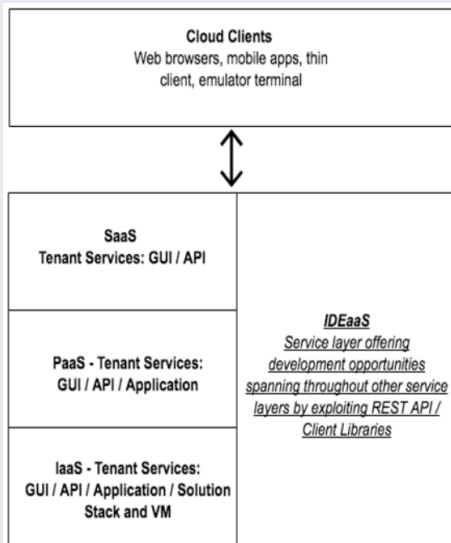
## Browser based IDE/SDK running on Cloud Webserver VM



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## IDEaaS incorporated into the cloud platform





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## Exploited Technologies

- Django Framework 1.11
- Python 2.7
- Modifying the `appcfg.main(argv)` of Google Client Libraries
- Browser based python development environment with Django framework
- Github project synchronization

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## Online SDK

The image displays four screenshots of the GAE Launcher SDK interface, arranged in a 2x2 grid. Each screenshot shows the 'Launcher' application with a navigation bar and a main content area.

- a) Project Creation:** The 'Create New Project' dialog is open. It contains fields for 'Application ID' (filled with 'launcher-test-pkg'), 'Site ID' (filled with 'PROJECT'), and 'Instance ID' (filled with 'INSTANCE'). A 'Submit' button is at the bottom.
- b) Logging:** A text area displays log output, including timestamps and application logs. The text is partially obscured by a grey box.
- c) Deployment:** The 'Deploy Project' dialog is open. It contains fields for 'Email' (filled with 'test@myapp.com') and 'Password'. A 'Submit' button is at the bottom.
- d) Online Development:** The 'Online Development' screen is shown. It features a code editor with a file tree on the left and a 'Deploy' button at the bottom.

## Current Features

- 1 Create/Delete project
- 2 Edit existing project files
- 3 Cloud deployment on the GAE VM
- 4 Rollback of deployment processes
- 5 Logging retrieval
- 6 Integration with other google cloud services for debugging

# GAE Launcher IDEaaS (I)

## Project Management IDE

☰ Title DJANGOCMS-1 ▾ Link Link Link Link

### 🔗 Project Info

Project Name:  
djangocms-1

Project ID:  
djangocms-1

Project Number:  
154625978169

→ GO TO PROJECT SETTINGS

### 🔗 Debug

→ GO TO PROJECT DEBUG

---

### 🔗 Logging

→ GO TO PROJECT LOGGING

### 🔗 IDE

Project Name:  
djangocms-1

Project ID:  
djangocms-1

Project Number:  
154625978169

→ GO TO IDE PAGE

### + Create Project

Project Name:

Your project ID will be:

Select region | Montréal ▾

\* For customers using the São Paulo region, all regional product SLAs remain in force. However, multi-region and cross-region functionality that span across North America and South America might temporarily have reduced availability or performance.

### 📁 Upload Project

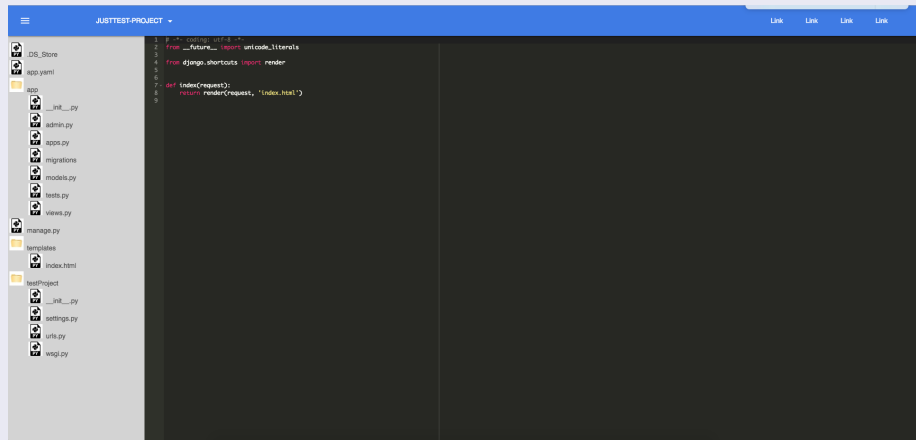
Project Name:  
 ▾

Upload Project:  
 No file chosen

Login with github to deploy the project

# GAE Launcher IDEaaS (II)

## Online IDE

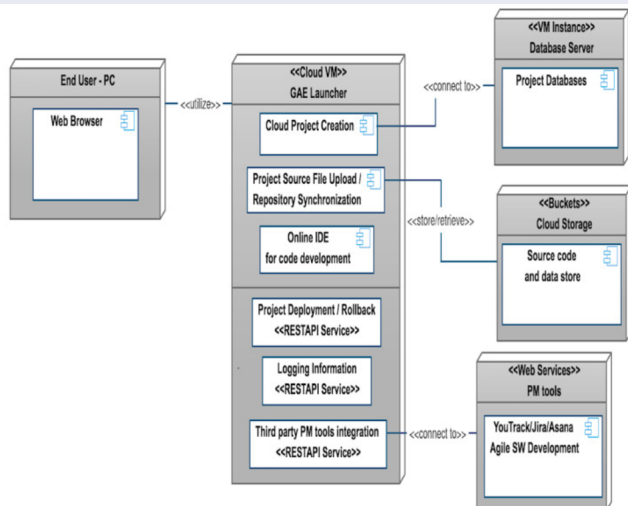


The screenshot shows an online IDE interface for a project named "JUSTTEST-PROJECT". On the left is a file explorer showing a directory structure with folders like "DS\_Store", "app.yaml", "app", "templates", and "testProject", and various Python files. The main area is a code editor showing the following Python code:

```
1 from __future__ import unicode_literals
2
3 from django.shortcuts import render
4
5
6
7 def index(request):
8     return render(request, 'index.html')
9
```

# GAELauncher adopted architecture based on IDEaaS models)

## Architecture





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## Characteristics

- 1 Not a new business model to the cloud
- 2 Adopted for coding utilizing resource hours
- 3 Configurations on the online IDE shared among all the project developers
- 4 Customer pricing might rely on per use basis, typically charged by the hour

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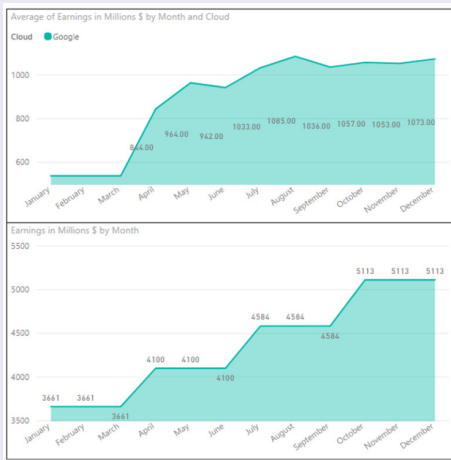
- 1 Outsourcing services to be facilitated and optimized whenever coding expertise is needed on demand
- 2 Large open source development cloud based communities
- 3 Fully integrated with existing freelancing platforms
- 4 Improved security, development policies, project cost evaluation and avoid over budgeting

# PaygoC and ODC business model canvas

## Lean Canvas

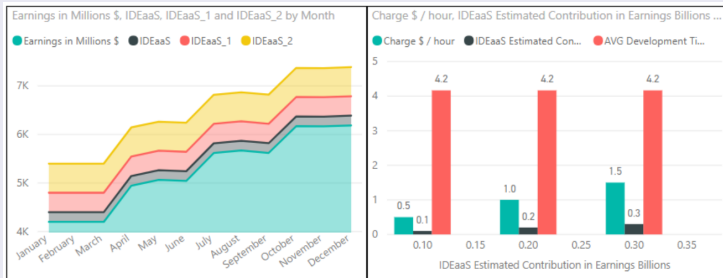
<b>Key Partners</b> <ul style="list-style-type: none"><li>• PM online tools and frameworks (<a href="#">Jira</a>, <a href="#">ASANA</a> etc.)</li><li>• Cloud Providers (Amazon, Azure, Google etc.)</li><li>• API, Third Party Libraries</li></ul>	<b>Key Activities</b> <ul style="list-style-type: none"><li>• Online Code Development and Deployment</li><li>• Revenues generated from Cloud End Users and Developers</li></ul> <b>Key Resources</b> <ul style="list-style-type: none"><li>• Developers</li><li>• Project Managers</li><li>• Cloud Applications</li><li>• Cloud Infrastructure</li><li>• Cloud Applications</li></ul>	<b>Value Proposition</b> <ul style="list-style-type: none"><li>• Coding Flexibility</li><li>• Real time Cooperative coding</li><li>• Faster application deployment</li><li>• Information sharing</li><li>• Increased time and cost productivity</li><li>• Improved freelancing opportunities</li></ul>	<b>Customer Relationships</b> <ul style="list-style-type: none"><li>• Cloud End User and Developer Services</li><li>• Cloud Console Platform</li></ul> <b>Channels</b> <ul style="list-style-type: none"><li>• Common cloud customers</li><li>• Professional oriented social networks (<a href="#">Linkedin</a>, <a href="#">Elance</a> etc.)</li></ul>	<b>Customer Segments</b> <ul style="list-style-type: none"><li>• Freelance Developers</li><li>• Small and Medium Cloud oriented companies</li><li>• Large cloud based enterprises</li></ul>
<b>Cost Structure</b> <ul style="list-style-type: none"><li>• Development and Maintenance costs</li><li>• Integration with third party services</li><li>• Contractual agreements</li><li>• Dedicated and shared cloud infrastructure costs</li></ul>		<b>Revenue Streams</b> <ul style="list-style-type: none"><li>• Application Development based on PM and Developers online payments</li><li>• High revenues based on the number of projects developed</li></ul>		

## Google and AWS cloud earnings taken from Statista



# PaygoC and ODC Statistics(II)

## Estimated improved earnings from IDEaaS



## How?

Approximately 2 Million cloud developers (accounting for 10% of global developers), with a daily overload of 4.2 hours.

The final earnings for three different charges of 0.5, 1 and 1.5\$/h to account up to 0.1, 0.2 and 0.3 Billion estimated yearly income increase

# Conclusions

- **New features** based on cloud end user demands
- Possibility to generate **solid revenues** for every provider adopting the PaygoC and ODC business models
- GAE Launcher provides all the features already offered from the Desktop SDK application but **integrating further new services**
- Offline provisioning and online synchronization solution as well as integration with other existing tools
- Adopting **machine learning and artificial intelligence** will ease the cloud application development process in the near future. Online IDE become a must.



Thank You!  
Questions?