

Week #10 Labs

10.1g: Large Language Models	1
5. Document loading	1
6. Document searching	2
8. -	3
11. -	4
10.2g: CDN	7
6. Deployment	7
8. Update deployment	9
9. Latency measurements	9
16. Test groups	10
19. Test load balancer	11
20. Siege! (Part 1)	12
21. Siege! (Part 2)	13

10.1g: Large Language Models

5. Document loading

The transformer extracts the “article” tags from the HTML retrieved by the loader. When the text is cleaned, the extra white spaces (tabs, newlines, double spaces) are all replaced with a single space. Then, the strip() method removes leading and trailing spaces.

Each chunk is split into 10,000 characters.

There are 1000 characters of overlap between chunks.

300 Documents are loaded at a time in the vector database.

```
(env) metens@ada:~/cs430-src/08_llm$ python 01_loaddb.py
Fetching pages: 100%|#####
RAG database initialized with the following sources.
https://www.pdx.edu/computer-science/faculty-and-staff-directory
https://www.pdx.edu/computer-science/student-resources
https://www.pdx.edu/computer-science/graduate-courses
https://www.pdx.edu/computer-science/program-objectives-outcomes
https://www.pdx.edu/computer-science/forms-and-policies
https://www.pdx.edu/computer-science/pcep-internship
https://www.pdx.edu/computer-science/graduate-admission
https://www.pdx.edu/computer-science/computer-science-0
https://www.pdx.edu/computer-science/biomedical-informatics
https://www.pdx.edu/computer-science/contact
https://www.pdx.edu/computer-science/bachelors-program-computer-science-capstone
https://www.pdx.edu/computer-science/graduate
https://www.pdx.edu/computer-science/advising-0
https://www.pdx.edu/computer-science/doctor-philosophy-phd
https://www.pdx.edu/computer-science/minor
https://www.pdx.edu/computer-science/discover-cs-cohort
https://www.pdx.edu/computer-science/strategic-vision
https://www.pdx.edu/computer-science/grad-prep
https://www.pdx.edu/computer-science/masters-track-courses
https://www.pdx.edu/computer-science/graduate-assistantships
https://www.pdx.edu/computer-science/honors-track
https://www.pdx.edu/computer-science/chair-statement
https://www.pdx.edu/computer-science/internships-and-research
https://www.pdx.edu/academics/programs/graduate/computer-science
https://www.pdx.edu/computer-science/mecop-internship-0
https://www.pdx.edu/computer-science/research-areas
https://www.pdx.edu/computer-science/support
https://www.pdx.edu/computer-science/graduate-internship-credit
https://www.pdx.edu/computer-science/bachelor
https://www.pdx.edu/computer-science/admissions-0
https://www.pdx.edu/computer-science/accreditation
https://www.pdx.edu/visit/
```

6. Document searching

Tell me about the MS program: (<https://www.pdx.edu/computer-science/master>)

```
http://127.0.0.1:5000/computer-science/master
This program queries documents in the RAG database that are similar to whatever is entered. A blank query exits the program.
>> Tell me about the MS program
Query database for: Tell me about the MS program
Closest document match in database: https://www.pdx.edu/computer-science/master
Document content is:
Master of Science The Master of Science (M.S.) in Computer Science is the first graduate degree in the field, and can take one and a half years of full-time study to complete. The master's program is designed to prepare students for advanced careers in the computing industry, to create a research environment in computer science, and to prepare students for graduate work at the Ph.D. level. Students entering the program must have a bachelor's degree and/or adequate background in computer science. The master's program requires the completion of an approved program of 45 credits with a thesis option. Coursework includes core courses in theory and programming practice, plus a 9-credit concentration in one specialization area. Core Requirements (6) Students are encouraged to take these courses as early as possible in your graduate program. One Theory course from: CS 581 Theory of Computation (3) CS 584 Algorithm Design & Analysis (3) CS 578 Programming Language Semantics (3) One Programming Practice course from: CS 558 Programming Languages (3) Any 500-level course designated by the department as programming intensive (noted by a P in the undergraduate course section) (3) Track Requirements (9) All students in the CS Master's program must take three courses from a single track of the following: Databases & Artificial Intelligence & Machine Learning; Languages & Programming; Security; Software Engineering; Systems & Networking; Theory. The list of required courses and approved electives for each track are listed in the "Track Courses page" (/../computer-science/node/171). Elective Requirements (30) Students must take enough electives to complete 45 total credits for the MS degree. Electives can be any 500-level CS course (/../computer-science/node/111) (see specific notes regarding CS 501-509 coursework below). A limited number of credits taken outside Computer Science can count towards the elective requirements, with advisor approval. Read more about Non-CS credits below. CS 505 (READING & CONFERENCE) AND CS 506 (SPECIAL PROJECT) CREDITS Students who are interested in exploring a specific topic or conducting a special research or other project for credit have the option to register in CS 505 (Reading & Conference) and/or CS 506 (Special Project) credits. A maximum of 6 credits of CS 505 and CS 506 can be counted towards the CS Master's degree elective requirements. Examples: CS 505 Reading & Conference: the student will study a textbook on a particular topic; complete the end of chapter problems; and discuss/present their chapter summaries, exercise solutions, and other content with the supervising faculty member. CS 506 Special Project: the student will gather and analyze data or research an agreed topic and write up their results in a presentable format under the guidance of the supervising faculty member. Students first need to find a faculty member to supervise these credits. The faculty member can help students to develop their idea, to ensure that it is consistent with the academic goals of the program, and to determine the appropriate course number, credit number, and project scope. They will assign the final grade at the end of the term. The By Arrangement Approval Dashboard can be used to register for CS 505/506 credits. Either the student or the faculty member can initiate a request, and once both have approved it, the request is automatically forwarded to the Department for approval and then to the Registrar's Office for processing. Thesis Option The thesis option requires the completion of 45 credits including 6-9 credits of CS 503 (Thesis) and an oral thesis defense. Students must follow PSU policies regarding committee appointments, defense procedures, formatting requirements, and submission procedures. University requirements and additional information for a master's thesis (/../gradschool/thesis-and-dissertation-information) are outlined by the PSU Graduate School. A thesis defense must take place in a meeting with the student and the appointed committee. It should be scheduled on a date that meets the GS deadline (/../gradschool/graduate-candidate-deadlines) for the desired graduation term. A room for the thesis defense may be scheduled through the CS department ( csoffice@pdx.edu (mailto:csoffice@pdx.edu) ). Thesis students will need to send their abstract/bio information and any requested equipment (projector) at least two weeks in advance of the defense to the CS Graduate Advisor ( gcss@pdx.edu (mailto:gcss@pdx.edu) ). Advising All newly admitted MS students will be advised by the CS Graduate Advisor. Every MS student is required to maintain a plan of study form (/../computer-science/sites /g/files/znidhr1671/files/2020-07/MS-Plan-of-Study.pdf) , which outlines both courses taken so far towards the degree and courses planned for the remainder of the program. This will also note any transfer and pre-admission courses, non-CS courses, and a student's intended track. An initial plan must be submitted to the CS Graduate Advisor.
```

Tell me about the Cybersecurity certificate: (<https://www.pdx.edu/computer-science/cybersecurity>)

```
>> Tell me about the Cybersecurity certificate
Query database for: Tell me about the Cybersecurity certificate
Closest document match in database: https://www.pdx.edu/computer-science/cybersecurity
Document content is: Cybersecurity Graduate Certificate The Cybersecurity Graduate Certificate program requires admission (/../computer-science/node/151) as a graduate student. The program requires 21 hours total of graduate classes. There are two core classes for a total of 6 hours. In addition, five elective classes must be taken to fulfill the needed additional 15 credit hours. Certificate Requirements Gain Admission to our Graduate CS Program as either an M.S. or Ph.D. candidate. Note that an M.S. candidate may choose to either get both an M.S. and the Cybersecurity Graduate Certificate, or just complete the Cybersecurity Graduate Certificate. Fill out the GO-19 form (/../gradschool/forms) needed for admission to the certificate program. Make sure you ADD a certificate to your program. You also need your advisor's signature on the form. Your advisor must approve your plan to get the Security Certificate. Please return the completed form to the Graduate Advisor. Once you have submitted your GO-19 form, the Security Admission Committee will meet and approve or deny your application. Applicants will be notified of the committee's decision via email. Course Requirements Required Core Courses (6) CS 591 Introduction to Computer Security (3) CS 595 Web and Cloud Security (3) Five of the following courses or approved substitute courses (15) CS 554 Principles of Software Engineering (3) CS 555 Software Specification and Verification (3) CS 556 Software Implementation and Testing (3) CS 576 Computer Security Seminar (3) CS 585 Cryptography (3) CS 592 Malware Reverse Engineering (3) CS 593 Digital Forensics (3) CS 594 Internetworking Protocols (3) CS 596 Network Security (3) Any CS 510 course in Security (3) (https://docs.google.com/spreadsheets/d/1Zzyb9ElzLwQOTYErZfoW9i2BM83b\_PFba6zWmzMELQs/edit#gid=0)
>> |
```

Tell me about PCEP: (<https://www.pdx.edu/computer-science/pcep-internship>)

```
>> Tell me about PCEP
Query database for: Tell me about PCEP
Closest document match in database: https://www.pdx.edu/computer-science/pcep-internship
Document content is: PCEP Internship What is the PSU/PDX Cooperative Education Program? The PSU/PDX Cooperative Education Program (PCEP) is a two-year cooperative educational program in which Computer Science students work 20 hours per week at one of our local PCEP Partner companies in a series of defined internship roles, while concurrently taking between eight and twelve credits each term on-campus at PSU. Pay begins at $27 an hour with semi-annual raises. New internship cycles start approximately every six months (January and July), and interns must work at two or more PCEP companies in at least two different roles during the program. Why Should I Care? The PCEP co-op will give you real-life experience in two different roles (software development and software automation) at two or more different local software companies while allowing you to take eight to twelve credits of coursework each term on campus. Not only will you gain technical experience, you'll also learn how to work in a professional environment as part of a team developing commercial software for a global customer base, while simultaneously building your professional network. A PCEP co-op will jumpstart your career as a software professional. Who Qualifies? Any student admitted to the B.S. Computer Science degree program at Portland State University, who will have completed CS163, CS205, CS302, and CS314, with grades of B or better, by the time their co-op begins may apply. In addition, applicants must have a 3.0 GPA over all required Computer Science coursework, be over 18, and have the permanent right to work in the United States (some positions require U.S. citizenship). See the Student Expectations for more information. What are the Important Dates I should know about? *All dates are subject to change OCTOBER 10, 2024 (Thursday): Mandatory Orientation Session via Zoom. One session will be held at noon, and one will be held at 6:30 PM. Preregister for one of these by selecting a time using this registration link (https://forms.gle/Cpam84ncjtqrF9fYA). You must attend this session in order to apply to the PCEP program. The registration cut-off is Tuesday, OCTOBER 8. A Zoom link will be sent to those that register using their #pdx.edu e-mail address by Wednesday, OCTOBER 9. OCTOBER 21, 2024 (Monday): Applications are due by noon (an application link will be emailed to those that register and attend Orientation). NOVEMBER 4, 2024 (Monday): PCEP Finalists invited to the RUSH. NOVEMBER 15, 2024 (Friday): PCEP RUSH. NOVEMBER 21, 2024 (Thursday): Placements Announced. JANUARY 6, 2025 (Monday): New Interns begin work. Register Who are the PCEP Companies? The PCEP companies are among some of the most exciting software companies in the Portland Metro area. Their markets range from computer security and web analytics to healthcare, social media solutions and county government, as well as everything in between. The PCEP companies are located in downtown Portland, so students have easy walking and public transportation options for getting back and forth between work and school. Many of the PCEP companies support hybrid or completely remote internships. In becoming a PCEP Partner, each company has acknowledged the student's educational goals are primary - they have agreed the internship program must augment, not conflict, with the educational goals of the student. This results in internships that are not only valuable to the company, but are also genuine educational experiences for the student.
>> |
```

Tell me about the capstone: (<https://www.pdx.edu/computer-science/bachelors-program-computer-science-capstone>)

```
>> Tell me about the capstone
Query database for: Tell me about the capstone
Closest document match in database: https://www.pdx.edu/computer-science/bachelors-program-computer-science-capstone
Document content is: BACHELOR'S PROGRAM IN COMPUTER SCIENCE CAPSTONE Capstone is taken by undergraduate students in the final year of their program. They will work in teams of 6-8 students on a six-month software development project to benefit a company, individual or organization in the community. Sponsoring organizations will be available to students on a regular basis to provide input and feedback as the project develops. New projects begin every quarter (Fall, Winter, Spring and Summer) and last for two quarters. Potential sponsors should consult the Guidelines for Sponsors (https://sites.google.com/pdx.edu/bruceirvin/capstone). The Capstone home page (https://sites.google.com/pdx.edu/bruceirvin/capstone) provides additional information about the program, including Capstone presentation videos.
>> |
```

8. -

How many credits does it take to complete the MS program?

```
llm>> How many credits does it take to complete the MS program?
It takes 45 credits to complete the MS program. There is also a thesis option.

For more information, please visit the following URLs:

* https://www.pdx.edu/computer-science/master
* https://www.pdx.edu/computer-science/masters-track-courses
* https://www.pdx.edu/computer-science/honors-track
```

How many core courses are there in the Cybersecurity certificate?

```
llm>> How many core courses are there in the Cybersecurity certificate?
There are two core courses in the Cybersecurity Graduate Certificate program. These courses total 6 credit hours.

For more information, please visit the following URLs:

* https://www.pdx.edu/academics/programs/graduate/cybersecurity-graduate-certificate
* https://docs.google.com/spreadsheets/d/1Zzyb9ElzLwQOTYErZfoW9i2BM83b\_PFba6zWmzMELQs/edit#gid=0
```

How many hours per week does a student work in PCEP?

```
llm>> How many hours per week does a student work in PCEP?  
Students in the PCEP program work 20 hours per week.
```

For more information, please visit the following URLs:

- * <https://www.pdx.edu/computer-science/pcep-internship>
- * <https://www.pdx.edu/computer-science/mecop-internship-0>
- * <https://www.pdx.edu/computer-science/contact>

How long is the capstone?

```
llm>> How long is the capstone?  
The capstone project is a six-month software development project that takes place over two quarters (Fall, Winter, Spring, or Summer).  
For more information, please visit the following URLs:  
  
* Capstone home page: https://sites.google.com/pdx.edu/bruceirvin/capstone  
* Guidelines for Sponsors: https://sites.google.com/pdx.edu/bruceirvin/capstone
```

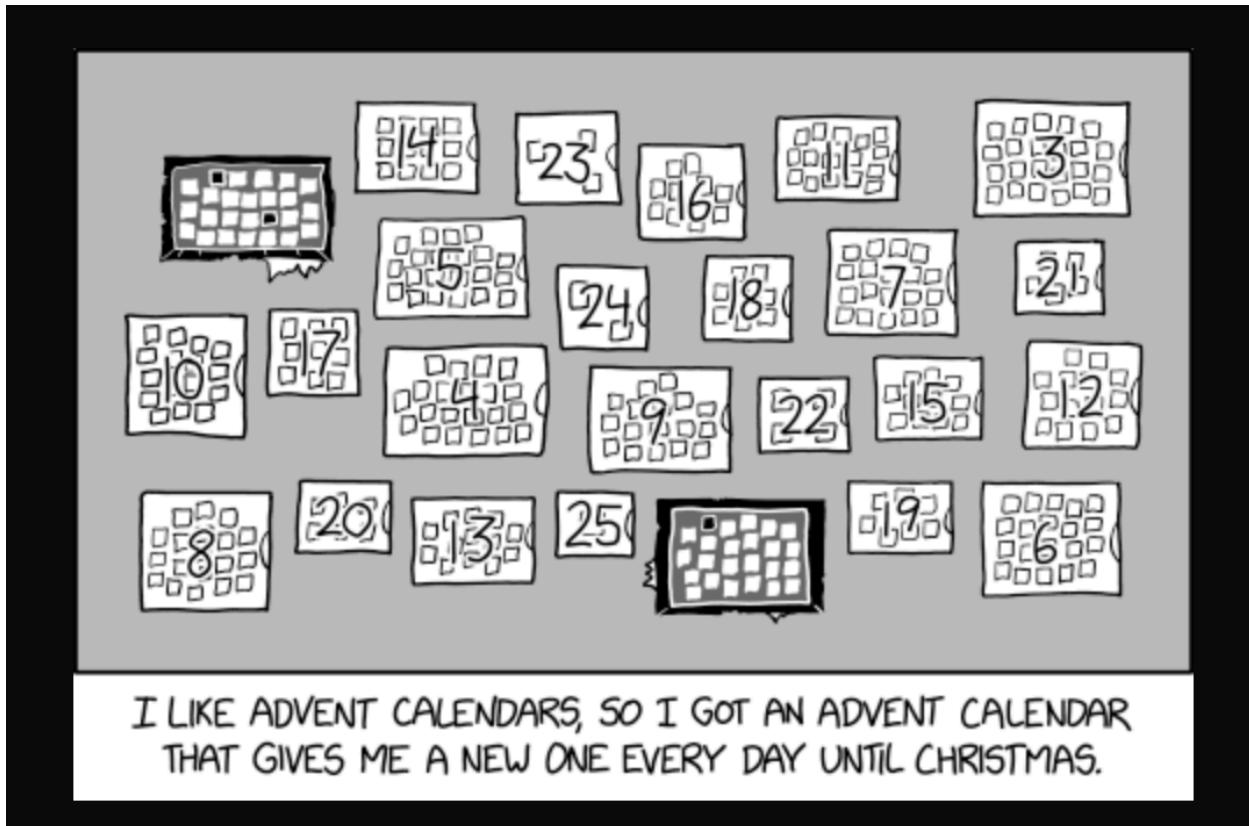
11. -

What is the current xkcd?

```
[env] neten@ada:~/cat00-rrt08 llm python 04_openapi_agent.py  
Welcome to my XKCD API application. I am configured with these tools generated by the OpenAPIToolkit:  
Tool: api_planner = Can be used to generate the right API calls to assist with a user query, like api_planner(query). Should always be called before trying to call the API controller.  
Tool: api_controller = Can be used to execute a plan of API calls, like api_controller(plan).  
llm>> What is the current xkcd?  
  
> Entering new AgentExecutor chain...  
Thought: I should generate a plan to help with this query and then copy that plan exactly to the controller.  
Action: api_planner  
Action Input: None  
Observation: I need to find the right API calls to get the current xkcd comic. Assuming an API endpoint exists like /xkcd that returns the current comic information.  
Thought: Plan 1: GET /info.0.json This call retrieves the current comic's information and metadata.  
Action: api_controller  
Action Input: 1. GET /info.0.json  
Plan: 1. GET /info.0.json  
  
Thought: I need to fetch the current comic's information using the '/info.0.json' endpoint. I'll use 'requests.get' for this.  
Action: requests.get  
Action Input:  
    json  
url": "http://xkcd.com/info.0.json"  
    "params": {}  
    "output_instructions": "Extract the 'num', 'title', 'img', 'alt', 'safe_title' fields. Return them as a dictionary.  
  
Observation: [json]  
[{"num": 3019, "title": "Advent Calendar Advent Calendar", "img": "https://imgs.xkcd.com/comics/advent_calendar_advent_calendar.png", "alt": "The growth rate of items per day may seem absurd, but it's actually much less than the acceleration in the 12 Days of Christmas song.", "safe_title": "Advent Calendar Advent Calendar"}]  
  
Thought: Thought: I have successfully retrieved the comic information. I am finished.  
  
Final Answer: The current XKCD comic is number 3019, titled "Advent Calendar Advent Calendar". The image URL is https://imgs.xkcd.com/comics/advent_calendar_advent_calendar.png, the alt text is "The growth rate of items per day may seem absurd, but it's actually much less than the acceleration in the 12 Days of Christmas song.", and the safe title is "Advent Calendar Advent Calendar".  
  
> Finished chain.  
Observation: The current XKCD comic is number 3019, titled "Advent Calendar Advent Calendar". The image URL is https://imgs.xkcd.com/comics/advent_calendar_advent_calendar.png, the alt text is "The growth rate of items per day may seem absurd, but it's actually much less than the acceleration in the 12 Days of Christmas song.", and the safe title is "Advent Calendar Advent Calendar".  
Thought: I am finished executing a plan and have the information the user asked for.  
Final Answer: The current XKCD comic is number 3019, titled "Advent Calendar Advent Calendar". The image URL is https://imgs.xkcd.com/comics/advent_calendar_advent_calendar.png, the alt text is "The growth rate of items per day may seem absurd, but it's actually much less than the acceleration in the 12 Days of Christmas song.", and the safe title is "Advent Calendar Advent Calendar".  
  
> Finshed chain.  
(input): 'What is the current xkcd?', 'output': 'The current XKCD comic is number 3019, titled "Advent Calendar Advent Calendar". The image URL is https://imgs.xkcd.com/comics/advent_calendar_advent_calendar.png, the alt text is "The growth rate of items per day may seem absurd, but it's actually much less than the acceleration in the 12 Days of Christmas song.", and the safe title is "Advent Calendar Advent Calendar".'  
llm>
```

What is the image link of the current xkcd?

```
"params": {},  
"output_instructions": "Extract the 'num', 'title', 'img', 'alt', 'safe_title' fields. Return them as a dictionary."  
]  
  
Observation: [{"json":  
  "num": 3019,  
  "title": "Advent Calendar Advent Calendar",  
  "img": "https://imgs.xkcd.com/comics/advent_calendar_advent_calendar.png",  
  "alt": "The growth rate of items per day may seem absurd, but it's actually much less than the acceleration in the 12 Days of Christmas song.",  
  "safe_title": "Advent Calendar Advent Calendar"}]  
  
Thought: I have successfully retrieved the comic information. I am finished.  
  
Final Answer: [{"comic_number": 3019,  
  "title": "Advent Calendar Advent Calendar",  
  "image_url": "https://imgs.xkcd.com/comics/advent_calendar_advent_calendar.png",  
  "alt_text": "The growth rate of items per day may seem absurd, but it's actually much less than the acceleration in the 12 Days of Christmas song.",  
  "safe_title": "Advent Calendar Advent Calendar"}]  
  
> Finished chain.  
  
Observation: [{"json":  
  "comic_number": 3019,  
  "title": "Advent Calendar Advent Calendar",  
  "img": "https://imgs.xkcd.com/comics/advent_calendar_advent_calendar.png",  
  "alt": "The growth rate of items per day may seem absurd, but it's actually much less than the acceleration in the 12 Days of Christmas song.",  
  "safe_title": "Advent Calendar Advent Calendar"}]  
  
Thought: I am finished executing a plan and have the information the user asked for.  
Final Answer: The image link of the current xkcd comic is: https://imgs.xkcd.com/comics/advent_calendar_advent_calendar.png  
  
> Finished chain.  
({'input': 'What is the image link of the current xkcd?', 'output': 'The image link of the current xkcd comic is: https://imgs.xkcd.com/comics/advent_calendar_advent_calendar.png'}  
l1m>>> ]
```



What was xkcd 327 about?

```
Action: requests_get
Action Input:
  ...json
  {
    "url": "http://xkcd.com/327/info.0.json",
    "params": {},
    "output_instructions": "Extract the 'title' and 'alt' fields from the JSON response."
  }
  ...

Observation: title: Exploits of a Mom
alt: Her daughter is named Help I'm trapped in a driver's license factory.
Thought: Thought: I have successfully retrieved the title and alt text for comic 327. The plan is complete.
Final Answer: The comic titled "Exploits of a Mom" has alt text: "Her daughter is named Help I'm trapped in a driver's license factory."

> Finished chain.

Observation: The comic titled "Exploits of a Mom" has alt text: "Her daughter is named Help I'm trapped in a driver's license factory."
Thought: I am finished executing a plan and have the information the user asked for.
Final Answer: The xkcd comic 327, titled "Exploits of a Mom", has alt text: "Her daughter is named Help I'm trapped in a driver's license factory.

> Finished chain.
{'input': 'What was xkcd 327 about?', 'output': 'The xkcd comic 327, titled "Exploits of a Mom", has alt text: "Her daughter is named Help I\'m trapped in a driver\'s l
icense factory.'}
lmm> █
```

10.2g: CDN

6. Deployment

```
metens@cloudshell:~/networking101 (cloud-metens)$ gcloud deployment-manager deployments create networking101 --config networking-lab.yaml
The fingerprint of the deployment is b'hXZPjyW9ohI948M9aCeRtg='
Waiting for create [operation-1733189553406-62853a3a8c3a4-b10e4c2b-9e6bfddb]...done.
Create operation operation-1733189553406-62853a3a8c3a4-b10e4c2b-9e6bfddb completed successfully.

NAME: asia-east1
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: asial-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: e1-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: eul-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: europe-west1
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: networking101
TYPE: compute.v1.network
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: us-east5
TYPE: compute.v1.subnetwork
```

```

NAME: us-east5
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: us-west-s1
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: us-west-s2
TYPE: compute.v1.subnetwork
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: w1-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:

NAME: w2-vm
TYPE: compute.v1.instance
STATE: COMPLETED
ERRORS: []
INTENT:
metens@cloudshell:~/networking101 (cloud-metens)$ 

```

Networks created: 1

Subnetworks created: 5

VM instances created: 5

VPC network details											
	Subnets										
	OVERVIEW SUBNETS STATIC INTERNAL IP ADDRESSES FIREWALLS FIREWALL ENDPOINTS ROUTES VPC NETWORK PEERING PRIVATE SERVICES A(
	Subnets										
	+ ADD SUBNET	MANAGE FLOW LOGS									
		Filter Enter property name or value	Name	Region	Stack Type	Primary IPv4 range	Secondary IPv4 ranges	IPv6 ranges	Reserved internal ranges	Gateway	Private Google Cloud
	asia-east1	asia-east1	IPv4 (single-stack)			10.40.0.0/16			None	10.40.0.1	Off
	europe-west1	europe-west1	IPv4 (single-stack)			10.30.0.0/16			None	10.30.0.1	Off
	us-east5	us-east5	IPv4 (single-stack)			10.20.0.0/16			None	10.20.0.1	Off
	us-west-s1	us-west1	IPv4 (single-stack)			10.10.0.0/16			None	10.10.0.1	Off
	us-west-s2	us-west1	IPv4 (single-stack)			10.11.0.0/16			None	10.11.0.1	Off

VM instances		CREATE INSTANCE	IMPORT VM	REFRESH								
VM instances												
<input type="checkbox"/> Filter Enter property name or value												
Status	Name ↑	Zone	Recommendations	In use by	Internal IP	External IP	Network	Connect				
<input checked="" type="checkbox"/>	asia1-vm	asia-east1-b			10.40.0.2 (nic0)	35.229.169.50 (nic0)	ne	SSH ▾				
<input checked="" type="checkbox"/>	course-vm	us-west1-b			10.138.0.2 (nic0)	34.162.178.1 (nic0)	de	SSH ▾				
<input checked="" type="checkbox"/>	e1-vm	us-east5-a			10.20.0.2 (nic0)	34.162.178.1 (nic0)	ne	SSH ▾				
<input checked="" type="checkbox"/>	eu1-vm	europe-west1-d			10.30.0.2 (nic0)	34.78.54.167 (nic0)	ne	SSH ▾				
<input checked="" type="checkbox"/>	gke-guestbook-default-pool-077391d3-8qsv	us-west1-b	gke-guestbook-default-pool-077391d3-	▼	10.138.0.35 (nic0)	34.168.178.197 (nic0)	de	SSH ▾				
<input checked="" type="checkbox"/>	gke-guestbook-default-pool-077391d3-8txw	us-west1-b	gke-guestbook-default-pool-077391d3-	▼	10.138.0.36 (nic0)	34.168.178.197 (nic0)	de	SSH ▾				
<input checked="" type="checkbox"/>	w1-vm	us-west1-b			10.10.0.2 (nic0)	34.168.178.197 (nic0)	ne	SSH ▾				
<input checked="" type="checkbox"/>	w2-vm	us-west1-b			10.11.0.100 (nic0)	35.230.31.229 (nic0)	ne	SSH ▾				

After clicking on the ssh button for one of the vms, it could not connect. I waited for 3 minutes and the connection was still 'loading'.

8. Update deployment

Google Cloud		cloud-metens ▾	<input type="text" value="vp"/>	X	 Search														
VPC networks		CREATE VPC NETWORK	REFRESH																
NETWORKS IN CURRENT PROJECT			SUBNETS IN CURRENT PROJECT																
i SMTP port 25 disallowed in this project. Learn more																			
VPC networks																			
<input type="checkbox"/> Filter Enter property name or value																			
Name ↑	Subnets	MTU ?	Mode	IPv6 ULA range	Gateways	Firewall rules	Global dynamic routing												
default	43	1460	Auto			19	Off												
networking101	5	1460	Custom			3	Off												

There are now 3 firewall rules after the update.

9. Latency measurements

Location Pair	Ideal Latency	Measured Latency
us-west1 us-east5	~45 ms	51.6 ms
us-west1 europe-west1	~93 ms	145 ms

us-west1 asia-east1	~114 ms	135 ms
us-east5 europe-west1	~76 ms	88.1 ms
us-east5 asia-east1	~141 ms	171 ms
europe-west1 asia-east1	~110 ms	257 ms

16. Test groups

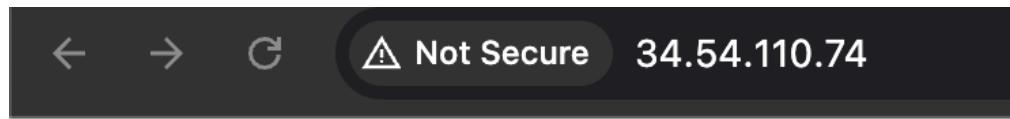
There are 3 instances of the 'europe-west1-mig' vms. Each of them are in different zones (b, c, d):

Not Secure 34.38.101.51	Not Secure 104.155.6.50	Not Secure 34.38.81.32
Networking 101 Lab	Networking 101 Lab	Networking 101 Lab
Client IP	Client IP	Client IP
Your IP address : 73.180.18.12	Your IP address : 73.180.18.12	Your IP address : 73.180.18.12
Hostname	Hostname	Hostname
Server Hostname: europe-west1-mig-j314	Server Hostname: europe-west1-mig-gwmf	Server Hostname: europe-west1-mig-t7bb
Server Location	Server Location	Server Location
Region and Zone: europe-west1-b	Region and Zone: europe-west1-c	Region and Zone: europe-west1-d

While the 'us-east5-mig' is a zone in the us:

Not Secure 34.162.51.145
Networking 101 Lab
Client IP
Your IP address : 73.180.18.12
Hostname
Server Hostname: us-east5-mig-kp6s
Server Location
Region and Zone: us-east5-a

19. Test load balancer



Networking 101 Lab

Client IP

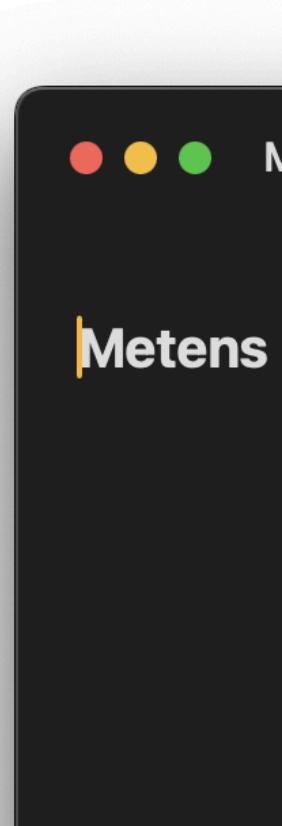
Your IP address : 35.191.54.16

Hostname

Server Hostname: us-east5-mig-kp6s

Server Location

Region and Zone: us-east5-a



The availability zone that the server handling this request resides in is **us-east5-a**.

20. Siege! (Part 1)



As we can see, the traffic distribution shifts.

21. Siege! (Part 2)

