

Managing Enterprise Cybersecurity

MIS 4596

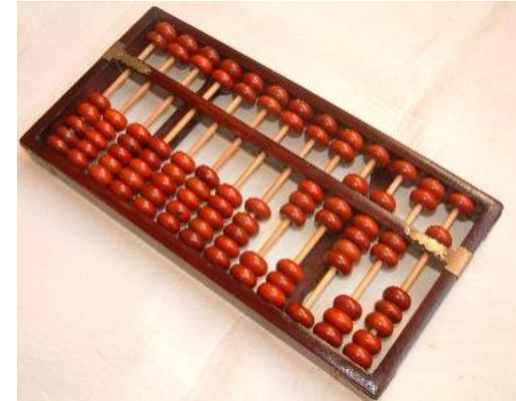
Class 5

Agenda

- Short history of computers, Unix and Linux
- In-Class Exercise: Introduction to the Google Cloud Platform
- In-Class Exercise: Introduction to Linux

Information Systems Development – a brief history

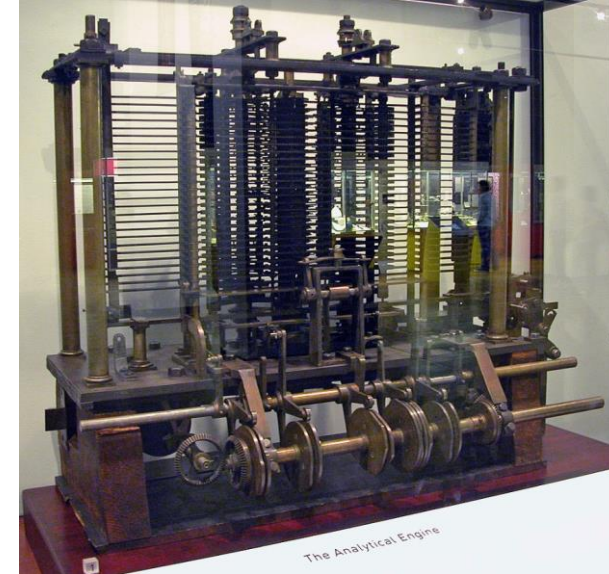
- **Prior 1946** - Before “stored-program” digital computers
 - Devices were pure hardware and had no software - their computing powers were directly tied to their specific form and engineering
- Computing as a concept goes back to ancient times
 - Beginning with devices such as the **abacus**
 - Calculating tool used in China, Europe, and Russia centuries before adoption of written Hindu-Arabic numeral system we use today
 - Continuing on through early examples of computing such as the **Antikythera** mechanism
 - Ancient Greek analog computer used as a calendar to predict eclipses and astronomical positions decades in advance



Wikipedia – History of Software

Information Systems Development – a brief history

- **Prior 1946** - Before “stored-program” digital computers
 - **1837 – The Analytical Engine**
 - First design for a general-purpose computer
 - Designed by English mathematician Charles Babbage
 - Incorporated:
 - Integrated memory
 - Arithmetic logic unit
 - Control flow in the form of conditional branching and loops
 - Logical structure essentially the same as the computer design that dominates in today’s electronic era
 - First known computer program was written by Ada Lovelace to implement Luigi Menabrea’s equations for generating a Bernoulli number sequence of rational numbers
 - The Analytical Engine predated the techniques of electrical engineering needed to run it

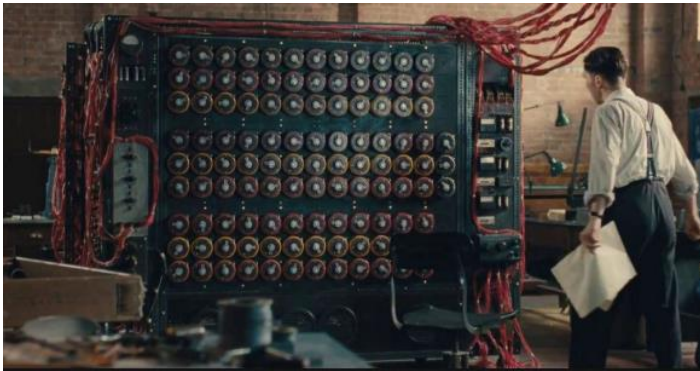


Wikipedia – History of Software

Information Systems Development – a brief history

Prior 1946 - Before “stored-program” digital computers

- **1935** – Alan Turing proposed the first modern theory of **software**
 - Software requires
 - A **general-purpose processor** - described as a Turing machine
 - **Computer memory**
 - In which reusable sets of routines and mathematical functions comprising programs can be stored, started, and stopped individually
- This concept is recent in human history, led to the creation of the twin academic fields of **computer science** and **software engineering**



Information Systems Development – a brief history

- **1948 – 1979** Early days of computer software

- 1948 - Claud Shannon “Father of Information Theory” wrote *A Mathematical theory of Communication* and provided an outline for how **binary logic** could be **implemented to program a computer**
 - Subsequently, the first computer programmers used binary code to instruct computers to perform various tasks
- 1948 – ***Birth of Software*** Tim Kilburn at the University of Manchester UK wrote the first program code stored in an electronic memory to calculate the highest factor of an integer
- 1950’s – 1960’s ***Development of high-level computer languages*** Fortran, LISP, COBOL and BASIC allowed programs to be specified in an abstract way, independent of the precise details of the hardware architecture of the computer



Grace Hopper developed the “self-documenting” COBOL (COmmon Business Oriented Language)



Margaret Hamilton led development of the onboard flight software for NASA’s Apollo spacecraft coined the term “software engineering”

Wikipedia – History of Software

Information Systems Development – a brief history

- **1948 – 1979** Early days of computer software and operating systems

- 1960's – Massachusetts Institute of Technology, AT&T Bell Labs, and General Electric jointly developed an experimental **time-sharing operating system** called Multics

- Allowing multiple users to access a **mainframe computer** simultaneously

- 1970's – Bell Lab's researchers left the team and implemented a **self-hosting operating system that became UNIX** on a **minicomputer**

- Included concepts of computer processes, device files, hierarchical file system, command-line interpreter, editor, programming shell, and assembler

- Text editor and first text formatting and publishing program written in assembly language

- 1971 – *UNIX Programmer's Manual* written

- 1973 – Unix Version 3 rewritten in higher-level C language

- Most popular variants of Unix today are

- macOS Mac OS X

- Linux

Wikipedia – History of Software



Information Systems Development – a brief history

Linux, computer operating system created in the early 1990s by Finnish software engineer Linus Torvalds and the Free Software Foundation (FSF)

- While still a student at the University of Helsinki, Torvalds started developing **Linux** to create a system similar to MINIX, a UNIX operating system

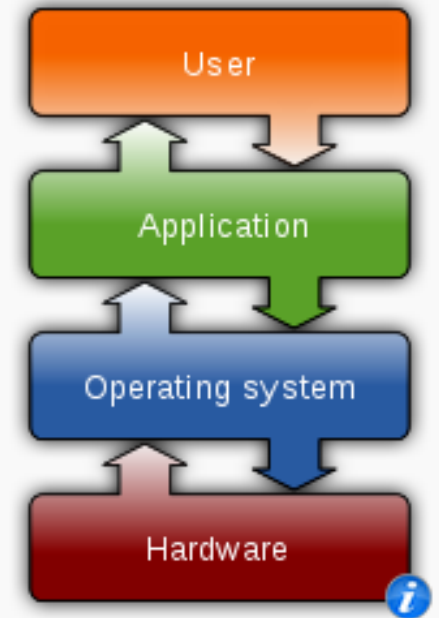
Computer Operating Systems

An **operating system (OS)** manages computer hardware, software resources, and provides common services for computer programs

Operating systems are found on many devices that contain a computer – cellular phones, video game consoles, web servers and supercomputers

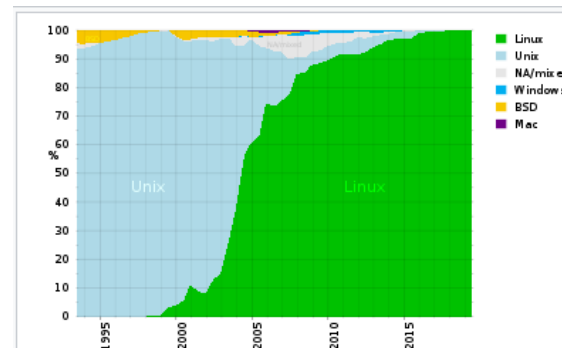
- Operating system acts as an **intermediary between programs and the computer hardware**
- **Desktop operating systems:**
 - Microsoft Windows with a market share of 76%
 - macOS by Apple Inc. is 17%
 - Chrome OS 2%
 - Varieties of Linux 2%
- **Mobile operating Systems** (including smartphones and tablets):
 - Google Android's share is 72% - January 2021
 - Apple's iOS is 27%
 - Other operating systems account for the remainder ~ .6%
- **Internet Server operating systems** (including web, application, database, & e-mail servers)
 - Linux 30%
 - Microsoft Windows 27%
- **Super-Computer operating systems**
 - Linux 100%

Operating systems



Common features

Process management · Interrupts ·
Memory management · File system ·
Device drivers · Networking · Security · I/O



Supercomputer OS family – 1993–2019 systems share according to TOP500^[223]

https://en.wikipedia.org/wiki/Operating_system

<https://w3techs.com/technologies/comparison/os-linux,os-windows>

Labs

- Lab: Threat Modeling with Attack Trees
- Lab: Web Privacy and Anonymity
- Lab: Symmetric Encryption and Hashing
- Lab: Asymmetric Encryption
- Lab: Digital Certificates
- Lab: Password Cracking
- Lab: Vulnerability Scanning
- Lab: Exploitation
- Lab: Social Engineering
- Lab: Network Security Monitoring and Security Onion
- Lab: Malware Analysis

Tutorials

- Tutorial: Introduction to Linux
- Tutorial: Introduction to Linux – Supplemental Cowsay Miniadventure
- Tutorial: Introduction to Google Cloud Platform
- Tutorial: Introduction to Networking

Lab Supplementary Files

Hosted on github, here. To download any one of them, click its link on that page, and then click "Download."

RECENT ANNOUNCEMENTS

[More Announcements...]

- Part 1: Join the class Google Group
 - Part 2: Sign up for Google Cloud Platform (GCP)
 - Part 3: Create a new project and launch a new Kali Linux instance
 - Part 4: Connect to your Kali Linux VM using Chrome Remote Desktop
 - Part 5: Set up budget alerts
 - Part 6: Install a GCP Console app on a mobile device
 - Part 7: Complete the Introduction to Linux Tutorial
- Deliverable

Introduction to Google Cloud Platform

By Drs. Anthony Vance and Dave Eargle

Part 1: Join the class Google Group

To get access to the Kali virtual machine created for this class:


1. If you don't already have one, create a personal Google account by signing up for one [here](#).

Heads up! Your TUMail Google account will not work with Google Cloud Platform. You'll need to use a personal Google account.

1. While logged into your personal Google account, visit [this link](#) to join the Google Group (public access) for this class.
2. Click "Join this group."

Join the infosec-management group

My display name:

 sarah...@gmail.com [edit](#)

Link to my [Google profile](#) and show my photo on posts [?](#)

Email used for your membership: sarahmvance@gmail.com

Email delivery preference: **Notify me for every new message (fewer than 1 per day)** ▾

Automatically subscribe me to email updates when I post to a topic

Other members of this group can find your email address and could discover your Google profile. Joining this group will grant you access to resources shared with the Group. [Learn More](#).

[Join this group](#) [Cancel](#)

By clicking "Join this group" you are agreeing to the [Google Groups Terms of Service](#).

Labs

- Lab: Threat Modeling with Attack Trees
- Lab: Web Privacy and Anonymity
- Lab: Symmetric Encryption and Hashing
- Lab: Asymmetric Encryption
- Lab: Digital Certificates
- Lab: Password Cracking
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RECENT ANNOUNCEMENTS

[More Announcements...]

Part 1. Linux shell primers
Part 2. Play the Bandit wargame on OvertheWire.org
Deliverable

Introduction to Linux

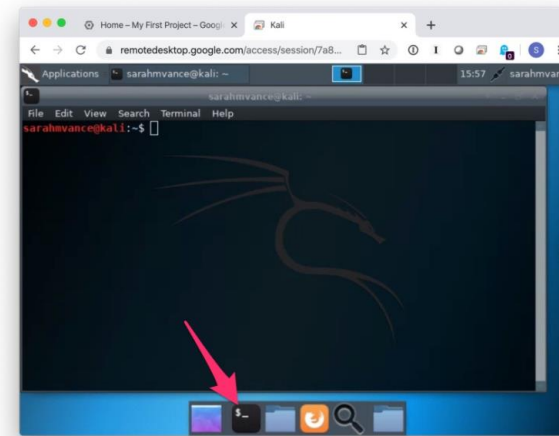
By Drs. Anthony Vance and Dave Eargle

Part 1. Linux shell primers

First, complete this introduction to Google Cloud Platform tutorial, up to but not including the deliverable, to set up your Kali Linux instance for use in the rest of Part 1.

Part 1.1. Complete a gentle introduction to the Linux terminal

Once you have your Kali Linux instance set up in GCP, open a terminal window in Kali by clicking the terminal icon in the application dock.



Introduction to Linux

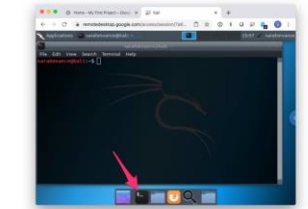
By Drs. Anthony Vance and Dave Eargle

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Once you have your Kali Linux instance set up in GCP, open a terminal window in Kali by clicking the terminal icon in the application dock.



Next, using the terminal in Kali, complete page 4 of all of this gentle introduction to the Linux terminal, aka this. Alternatively, simply take a few set of follow-along video before demonstrations that you might prefer instead.

Part 1.2. Text manipulation

In addition to the above tutorial, complete the following short pages from this on about text manipulation:

- 1. vi/vim
- 2. nano
- 3. emacs
- 4. sed and awk
- 5. wc, cat, cd
- 6. mv, cp

Part 1.3. Learn a text editor

You can use text editors to edit text files from a shell. Search for and complete an introductory tutorial to a command-line text editor, such as this one for nano.

Earlier you, visit the intro nano video link from the library course mentioned above.

Part 2. Play the Bandit wargame on OvertheWire.org

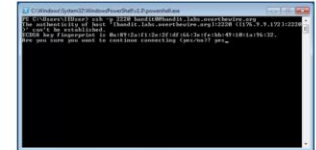
Play the Bandit wargame on OvertheWire.org. Start at level 0 and complete level 15 (which gives you the password for level 16).

To play, you'll need to connect to the Bandit server using an SSH client. SSH stands for Secure Shell, and allows you to remotely control a server using a command-line interface. SSH is secure because your connection to the server is encrypted using a symmetric cipher like AES. It also uses asymmetric cryptography such as RSA to establish the server's identity.

Using SSH on Windows

If you're using Windows, open a PowerShell window by typing powershell in Windows search and pressing enter.

Enter the username (bandit), an IP address, and port (2200) into PowerShell like so:



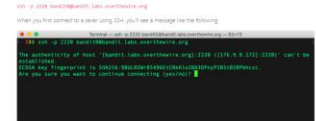
The password is bandit0.

The following command will set a name. SSH tells you that you haven't connected to this server before, and this is a "fingerprint" of the server. You can get an idea of what a unique fingerprint. To learn more about verifying SSH fingerprints, see this.

To continue logging in, type ssh (which shows where you are) and press enter.

Using SSH on MacOS

If you're using a Mac, open a terminal app. For use the ssh command to connect to the Bandit server like so:



This message tells you that you haven't connected to this server before. The Bandit server is using a 2200 port which is not the default. The fingerprint is a hash of the server's public key. To learn more about verifying SSH fingerprints, see this.

To continue logging in, type ssh (which shows where you are) and press enter.

Instructions

- After you open your password, you won't see any characters. This is a security feature to prevent shoulder surfing. Enter the password quickly and press enter to login.
- After an initial failure, instruct you to login to the Bandit server using SSH. Note, and the user name is bandit. The instructions on how to get to the next level. Continue until you successfully complete level 15 (which gives you the password for level 16).
- Use the ssh command and search the web to learn about the recommended commands (i.e., "Commands you may need to see on the web" to help you reach the next level. Learning for yourself how to use new commands is a key goal of this tutorial.

Deliverable

Get your first screenshots like a screenshot of your terminal screen showing the following:

- Enter the password for the next level.
- Run the nano command to show the current date.
- Print out your name with echo "Your name".

Add all of the screenshots to Word documents and submit the document in the usual submit quiz on Canvas.



Part 1: Join the class Google Group

Part 2: Sign up for Google Cloud Platform (GCP)

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Deliverable

Introduction to Google Cloud Platform

By Drs. Anthony Vance and Dave Eargle

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To get access to the Kali virtual machine created for this class:

1. If you don't already have one, create a personal Google account by signing up for one [here](#).



Heads up! Your TUMail Google account will not work with Google Cloud Platform. You'll need to use a personal Google account.

The screenshot shows the Google account creation interface. At the top left is the Google logo. Below it is the heading "Create your Google Account". There are two input fields for "First name" and "Last name". Below these is a "Username" field with a placeholder "@gmail.com" and a note "You can use letters, numbers & periods". A link "Use my current email address instead" is provided. There are "Password" and "Confirm" fields with a note "Use 8 or more characters with a mix of letters, numbers & symbols" and a "Show password" checkbox. At the bottom left is a "Sign in instead" link and at the bottom right is a blue "Next" button. On the right side of the form is an illustration of a blue shield with a white person icon, and below it, a laptop with icons for YouTube, Gmail, and Maps. Text below the illustration reads "One account. All of Google working for you."

1. While logged into your personal Google account, visit [this link](#) to join the Google Group (public access) for this class.



☆ infosec-management


Join group



This group is managed by me, Dave Eargle. You must be a member of this google group if you want access to my google cloud infosec compute engine images. This group is open for anyone to join. I do not have to approve your join requests before you become a group member – you automatically become a group member if you request to join. If you email me saying you'd like to join the group, I will instruct you to google something like "how to join an open google group." If you're in a class using my images and you're having trouble joining the group, ask your instructor for help.

I had to create this group in order for the public to have access to my google cloud images because gcp doesn't have a way to make custom images open to the public internet – but it *does* have a way to make images available to anyone in given google groups.

Join infosec-management

 Display name
Phillip Nontenure

Link to my Google account profile ⓘ

SUBSCRIPTION

Every new message ▾

Subscribe me to email updates when I post to a conversation

Cancel [Join group](#)

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Deliverable

Part 2: Sign up for Google Cloud Platform (GCP)

- Visit <https://cloud.google.com> and click "Get started for free."
- Make sure you are signed in to Google with your personal account (not your TUMail Google account).
- Step 1 of 2: Agree to the terms of service.
- Step 2 of 2: Choose "Account type" > "Individual". Complete the sign-up form. Provide a credit card.

Why a credit card? Google still requires a credit card to make sure you are not a robot. Google will not autocharge your account unless you manually upgrade to a paid plan.

- Click "Start my free trial".

cloud.google.com

Google Cloud Why Google Solutions Products Pricing Getting Started Contact Us

New customers get \$300 in free credits to spend on Google Cloud. All customers get free usage of 20+ products. [See offer details.](#)

Accelerate your transformation with Google Cloud

Build apps faster, make smarter business decisions, and connect people anywhere.

[Get started for free](#)

Run on the cleanest cloud in the industry. [Learn more.](#)

- Develop new apps and experiences faster
Avoid vendor lock-in and speed up development with Google Cloud's commitment to open source, multicloud, and hybrid cloud.
- Enable smarter decision making across your organization
Give anyone on your team access to business insights with Google Cloud's machine learning and advanced analytics capabilities.
- Transform how you connect and collaborate
Reimagine how you connect in-person and remotely with integrated video calling, email, chat, and document collaboration apps.
- Build and invest in your cloud with confidence
Protect your data with advanced security services, save money with innovative pricing, and run your apps on the cleanest cloud in the industry.

Leading companies trust Google Cloud

Try Google Cloud Platform for free

Step 1 of 2



Phillip Nontenure
phillipnontenure@gmail.com

[SWITCH ACCOUNT](#)

Country

United States

Terms of Service

I agree to the [Google Cloud Platform Terms of Service](#), and the terms of service of [any applicable services and APIs](#). I have also read and agree to the [Google Cloud Platform Free Trial Terms of Service](#).

Required to continue

CONTINUE



Access to all Cloud Platform Products

Get everything you need to build and run your apps, websites and services, including Firebase and the Google Maps API.

\$300 credit for free

Put Google Cloud to work with \$300 in credit to spend over the next 90 days.

No autocharge after free trial ends



We ask you for your credit card to make sure you are not a robot. You won't be charged unless you manually upgrade to a paid account.



Try Google Cloud Platform for free

Step 2 of 2

Your payment information helps us reduce fraud and abuse. You won't be charged unless you turn on automatic billing.

 Account type 

Individual

Only Business accounts can have multiple users. You cannot change the account type after signing up. In some countries, this selection affects your tax options. [Learn more](#)

Payment method

 Add credit or debit card 

Card number MM / YY CVC

#

Card number is required

Cardholder name

Phillip Nontenure

 Billing address

When billing starts, you'll be charged automatically, typically monthly.

START MY FREE TRIAL



Access to all Cloud Platform Products

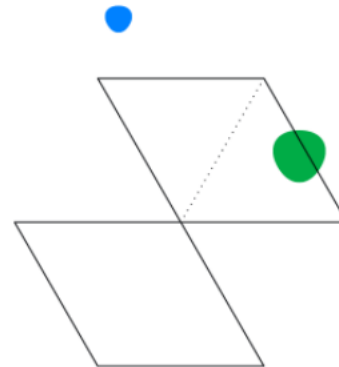
Get everything you need to build and run your apps, websites and services, including Firebase and the Google Maps API.

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Home >

Marketplace

Billing

APIs & Services >

Support >

IAM & Admin >

Getting started

Security >

Compliance

Anthos >

COMPUTE

App Engine >

Compute Engine >

Kubernetes Engine >

Cloud Functions

Cloud Run

VMware Engine

STORAGE

Welcome, Phillip

Get started with Google Cloud

Begin with the basics

Get up and run

GO TO CHECKLIST

Setting up Google Cloud
Use the [Google Cloud](#)



Welcome Phillip!

Thanks for signing up. Your free trial includes \$300 in credit to spend over the next 90 days. If you run out of credit, don't worry – you won't be billed unless you [turn on automatic billing](#).

GOT IT

Top products

Compute products



Compute Engine

Made by Google

Scalable, high-performance virtual machines

GO TO COMPUTE ENGINE

Other popular compute options

[Kubernetes Engine](#)

One-click Kubernetes clusters, managed by Google

[App Engine](#)

A platform to build web and mobile apps that scale automatically

[Cloud Run](#)

Fully managed compute platform for deploying and scaling containerized applications quickly and securely

Part 3: Create a new project and launch a new Kali Linux instance

Part 1: Join the class Google Group

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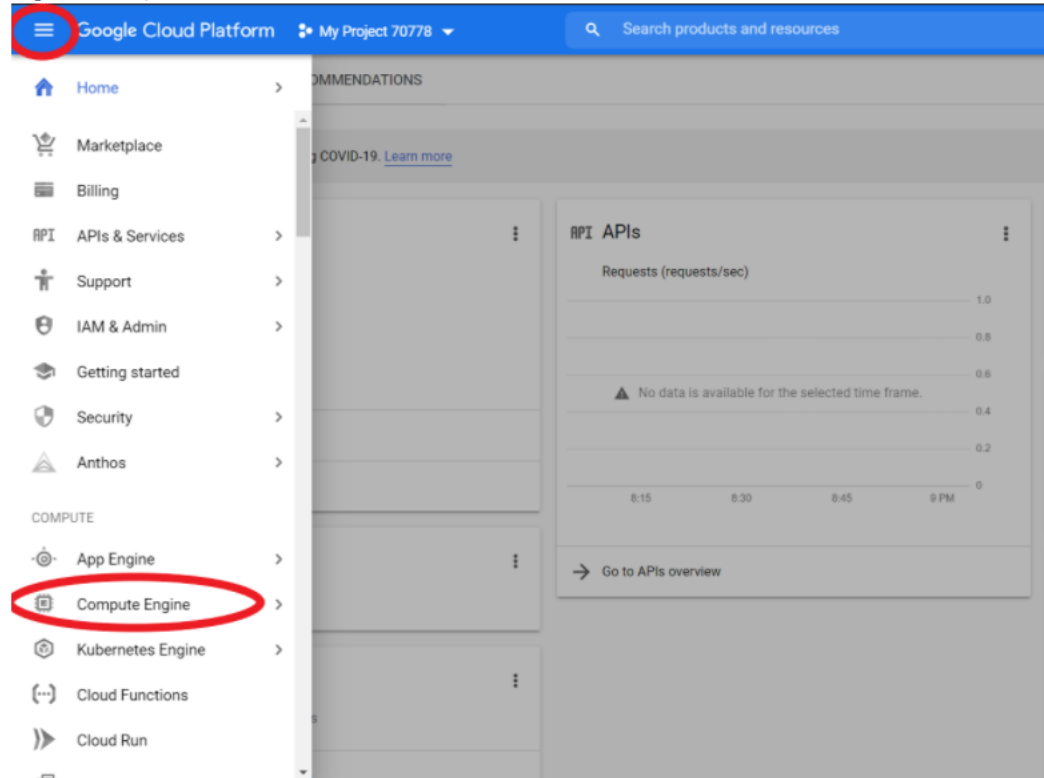
Part 5: Set up budget alerts

Part 6: Install a GCP Console app on a mobile device

Part 7: Complete the Introduction to Linux Tutorial

Deliverable

- First, create a new “project” which will house all of the material for this class.
- Then, expand the hamburger menu and navigate to the “Compute Engine” area. Wait a few minutes for Compute Engine to set up.



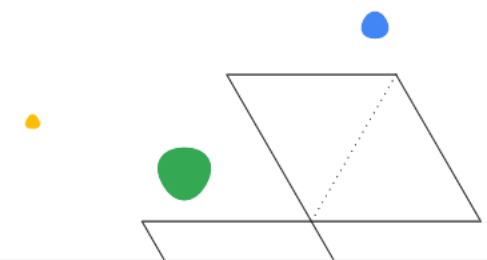
- Click “Create”.
- In the “name” field, enter a name like “kali-linux-vm” (must be all lowercase).
- Give your new virtual machine instance the following specs:
 - **Important:** Leave the “Region” field set to “us-central1”.
 - Leave the “Series” field set to “N1”
 - Change the “Machine type” field to “n1-standard-4 (4 vCPU, 15 GB memory)”
 - Click the “CPU platform and CPU” link

- Home
- Marketplace
- Billing
- APIs & Services
- Support
- IAM & Admin
- Getting started
- Security
- Compliance
- Anthos
- COMPUTE
 - App Engine
 - Compute Engine
 - Kubernetes Engine
 - Cloud Functions
 - Cloud Run
 - VMware Engine
- STORAGE

- VIRTUAL MACHINES
 - VM instances
 - Instance templates
 - Sole-tenant nodes
 - Machine images
 - TPUs
 - Migrate for Compute Engine
 - Committed use discounts
- STORAGE
 - Disks
 - Snapshots
 - Images
- INSTANCE GROUPS
 - Instance groups
 - Health checks
- VM MANAGER
 - OS patch management
- SETTINGS
 - Metadata
 - Zones
 - Network endpoint groups
 - Operations
 - Security scans

Welcome, Phillip

Get started with Google Cloud



Begin with the basics

Get up and running quickly by checking off common tasks

[GO TO CHECKLIST](#)

Setting up Google Cloud for scalable, production-ready enterprise workloads? Use the [Google Cloud setup checklist](#) designed for administrators.

What's covered

- Reviewing billing, credits, and projects
- Finding products and APIs
- Adding resources to a project
- Understanding and calculating pricing

Top products

[VIEW ALL](#)

Compute products



Compute Engine

Made by Google

Scalable, high-performance virtual machines

[GO TO COMPUTE ENGINE](#)

Other popular compute options

[Kubernetes Engine](#)

One-click Kubernetes clusters, managed by Google

[App Engine](#)

A platform to build web and mobile apps that scale automatically

[Cloud Run](#)

Fully managed compute platform for deploying and scaling containerized applications quickly



Compute Engine

VM instances

Virtual machines



VM instances



Instance templates



Sole-tenant nodes



Machine images



TPUs



Migrate for Compute Engi...



Committed use discounts

Storage



Disks

You can use Compute Engine after you enable billing

Pay only for what you use. [Learn more about Compute Engine pricing.](#)

Enable billing



Compute Engine

Compute Engine lets you create and run virtual machines on Google infrastructure. Compute Engine offers scale, performance, and value that allows you to easily launch large compute clusters on Google's infrastructure.

Compute Engine

VM instances

Virtual machines

VM instances

Instance templates

Sole-tenant nodes

Machine images

TPUs

Migrate for Compute Engi...

Committed use discounts

Storage

Disks

Snapshots

Images

Instance groups

You can use Compute Engine after you enable billing

Pay only for what you use. [Learn more about Compute Engine pricing.](#)

Enable billing

Compute Engine

Set the billing account for project "My First Project"

Please select a Google Cloud Platform billing account to support this project. Some billing accounts may not be available. [Learn more](#)

Billing account

There is only one billing account currently available to link this project to

My Billing Account

CANCEL

SET ACCOUNT





Compute Engine

VM instances

Virtual machines



VM instances



Instance templates



Sole-tenant nodes



Machine images



TPUs



Migrate for Compute Engi...



Committed use discounts

Storage



Disks



Snapshots



Images

Compute Engine is getting ready. This may take a minute or more. [Compute Engine documentation](#)

Compute Engine

VM instances

Compute Engine lets you use virtual machines that run on Google's infrastructure. Create micro-VMs or larger instances running Debian, Windows, or other standard images. Create your first VM instance, import it using a migration service, or try the quickstart to build a sample app.

[Create](#)

or

[Import](#)

or

[Take the quickstart](#)

Create an instance

To create a VM instance, select one of the options:

- New VM instance**
Create a single VM instance from scratch
- New VM instance from template**
Create a single VM instance from an existing template
- New VM instance from machine image**
Create a single VM instance from an existing machine image
- Marketplace**
Deploy a ready-to-go solution onto a VM instance

Name ?
Name is permanent

Labels ? (Optional)

Region ?
Region is permanent

Zone ?
Zone is permanent

Machine configuration

Machine family


General-purpose | Compute-optimized | Memory-optimized | GPU

Machine types for common workloads, optimized for cost and flexibility

Series

Powered by Intel Skylake CPU platform or one of its predecessors

Machine type

| | vCPU | Memory | GPUs |
|---|------|--------|------|
|  | 4 | 15 GB | - |

CPU platform ?
CPU platform configuration is permanent

GPU

Display device

Turn on a display device if you want to use screen capturing and recording tools.

Turn on display device

⤴ CPU platform and GPU

Confidential VM service ?

Enable the Confidential Computing service on this VM instance.

Container ?

Deploy a container image to this VM instance. [Learn more](#)

Boot disk ?



New 10 GB standard persistent disk

Image

 Debian GNU/Linux 10 (buster)

Change



Boot disk

Select an image or snapshot to create a boot disk; or attach an existing disk. Can't find what you're looking for? Explore hundreds of VM solutions in [Marketplace](#)

Public images **Custom images** Snapshots Existing disks

Show images from
infosec management

Show deprecated images

Image
kali-v2-0-1

Created on Sep 1, 2020, 2:44:49 PM, bugfix, creates and autostarts vagrant-libvirt network so that virt-manager can work in place of vagrant

Boot disk type ? Size (GB) ?
Standard persistent disk 500

Select

Cancel



⤴ CPU platform and GPU


Confidential VM service ?

Enable the Confidential Computing service on this VM instance.

Container ?

Deploy a container image to this VM instance. [Learn more](#)

Boot disk ?

 New 500 GB standard persistent disk
Image
kali-v2-0-1 Change

Identity and API access ?

Service account ?

Compute Engine default service account ▼

Access scopes ?

Allow default access

Allow full access to all Cloud APIs

Set access for each API

Firewall ?

Add tags and firewall rules to allow specific network traffic from the Internet

- Allow HTTP traffic
- Allow HTTPS traffic

⤴ Management, security, disks, networking, sole tenancy

Your free trial credit will be used for this VM instance. [GCP Free Tier](#) ↗

Create Cancel



ST or command line

Google Cloud Platform My First Project Search products and resources

Compute Engine VM instances CREATE INSTANCE IMPORT VM REFRESH MANAGE ACCESS SHOW INFO PANEL

Virtual machines VM instances Instance templates Sole-tenant nodes Machine images TPUs Migrate for Compute Engi... Committed use discounts Storage Disks

Filter VM instances Columns

| Name | Zone | Recommendation | In use by | Internal IP | External IP | Connect |
|--|---------------|----------------|-----------|-------------------|--------------|---------|
| <input type="checkbox"/> kali-linux-vm | us-central1-a | | | 10.128.0.2 (nic0) | 34.121.200.9 | SSH |

Related Actions

- View Billing Report: View and manage your Compute Engine billing
- Monitor VMs: View outlier VMs across metrics like CPU and Network
- Explore VM Logs: View, search, analyze, and download VM instance logs
- Setup Firewall Rules: Control traffic to and from a VM instance
- Patch Management: Schedule patch updates and view patch compliance on VM instances

SSH menu options:

- Open in browser window
- Open in browser window on custom port
- Open in browser window using provided private SSH key
- View gcloud command
- Use another SSH client

```
Linux kali 5.7.0-kali1-amd64 #1 SMP Debian 5.7.6-1kali2 (2020-07-01) x86_64

The programs included with the Kali GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Kali GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
phillipnontenure@kali:~$
```

```
Linux kali 5.7.0-kali1-amd64 #1 SMP Debian 5.7.6-1kali2 (2020-07-01) x86_64
```

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```

```
Kali GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.
```

```
phillipnontenure@kali:~$
```

Chrome Remote Desktop

remotedesktop.google.com/headless?pli=1

Google Chrome Remote Desktop

Remote Access Remote Support

Set up another computer

If you have remote access to a computer, for example via Secure Shell (SSH), you can use this page to set it up for graphical remote access using Chrome Remote Desktop.

[BEGIN](#)

Help Send Feedback Privacy Terms

Cloud Computing Services | Google Cloud Platform | Introduction to Google Cloud

console.cloud.google.com/compute/instances?project=eng-cogency-303...

Google Cloud Platform

Compute Engine

VM instances

Virtual machines

- VM instances
- Marketplace

| Name | Zone | Recommendati |
|-------|--------------|--------------|
| kali- | us-central1- | |

Start your project

Now that you've created a VM instance, learn how to put it to work for you.

[Connect to your instance](#)

[Transfer files](#)

Find existing VM solutions

[Explore Marketplace](#)

Chrome Remote Desktop

remotedesktop.google.com/headless?pli=1

Google Chrome Remote Desktop

Remote Access Remote Support

Set up another computer

Download and install Chrome Remote Desktop on the remote computer:

- Windows: <https://dl.google.com/edgedl/chrome-remote-desktop/chromeremotedesktophost.msi>
- Debian Linux: https://dl.google.com/linux/direct/chrome-remote-desktop_current_amd64.deb

NEXT

Chrome Remote Desktop is already installed on Kali



Set up another computer

Authorize Chrome Remote Desktop to set up a new computer. A separate window will open and you may be prompted to choose an account, enter your password, or give permission for Chrome Remote Desktop to access your account.

[AUTHORIZE](#)



Set up another computer

You're nearly finished! Run the following command on the remote computer to complete the setup process. Please note that this command can only be used to set up one computer; click Start over if you have more computers to set up.

Windows (Cmd)

```
"%PROGRAMFILES(X86)%\Google\Chrome Remote Desktop\CurrentVersion\remoting_start_host.exe" --code="4/0AY0e-g776BhtI3AMe8soEQQFEmBxqgVIBWlr3iQ3N1KwNj4yMwioQ35EjqM8vvxoeajmsA" --
```

Windows (PowerShell)

```
& "${Env:PROGRAMFILES(X86)}\Google\Chrome Remote Desktop\CurrentVersion\remoting_start_host.exe" --code="4/0AY0e-g776BhtI3AMe8soEQQFEmBxqgVIBWlr3iQ3N1KwNj4yMwioQ35EjqM8vvxoeajmsA" --
```

Debian Linux

```
DISPLAY= /opt/google/chrome-remote-desktop/start-host --code="4/0AY0e-g776BhtI3AMe8soEQQFEmBxqgVIBWlr3iQ3N1KwNj4yMwioQ35EjqM8vvxoeajmsA" -- redirect-url="https://remotedesktop.google.com/_/oauthredirect" --
```



Copy to clipboard.

START OVER

• Copy

```
Linux kali 5.7.0-kali1-amd64 #1 SMP Debian 5.7.6-1kali2 (2020-07-01) x86_64
```

```
The programs included with the Kali GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.
```

```
Kali GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.
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```
phillipnontenure@kali:~$ DISPLAY= /opt/google/chrome-remote-desktop/start-host --code="4/0AY0e-g776BhtI3AMe8soEQQFEm  
BxqgVIBW hr3iQ3N1KwNj4yMwioQ35EjqM8v vxoeajmsA" --redirect-url="https://remotedesktop.google.com/_/oauthredirect" --na  
me=$(hostname)
```

```
phillipnontenure@kali:~$ DISPLAY= /opt/google/chrome-remote-desktop/start-host --code="4/0AY0e-g776BhtI3AMe8soEQQFEm  
BxqgVIBW hr3iQ3N1KwNj4yMwioQ35EjqM8v vxoeajmsA" --redirect-url="https://remotedesktop.google.com/_/oauthredirect" --na  
me=$(hostname) Kali
```

```
phillipnontenure@kali:~$ DISPLAY= /opt/google/chrome-remote-desktop/start-host --code="4/0AY0e-g776BhtI3AMe8soEQQFEm  
BxqgVIBW hr3iQ3N1KwNj4yMwioQ35EjqM8v vxoeajmsA" --redirect-url="https://remotedesktop.google.com/_/oauthredirect" --na  
me=$(hostname) Kali  
Enter a PIN of at least six digits:  
Enter the same PIN again:
```

- Paste = Ctrl v

- Type "Kali" then return

- Type a 6 digit pin (twice),
remember to write it down and
save it for later



Set up another computer

You're nearly finished! Run the following command on the remote computer to complete the setup process. Please note that this command can only be used to set up one computer; click Start over if you have more computers to set up.

Windows (Cmd)

```
"%PROGRAMFILES(X86)%\Google\Chrome Remote Desktop\CurrentVersion\remoting_start_host.exe" --code="4/0AY0e-g776BhtI3AMe8soEQQFEmBxqgVIBWhr3iQ3N1KwNj4yMwioQ35EjqM8vvxoeajmsA" --
```



Windows (PowerShell)

```
& "${Env:PROGRAMFILES(X86)}\Google\Chrome Remote Desktop\CurrentVersion\remoting_start_host.exe" --code="4/0AY0e-g776BhtI3AMe8soEQQFEmBxqgVIBWhr3iQ3N1KwNj4yMwioQ35EjqM8vvxoeajmsA" --
```



Debian Linux

```
DISPLAY= /opt/google/chrome-remote-desktop/start-host --code="4/0AY0e-g776BhtI3AMe8soEQQFEmBxqgVIBWhr3iQ3N1KwNj4yMwioQ35EjqM8vvxoeajmsA" --redirect-url="https://remotedesktop.google.com/_oauthredirect" --
```



Chrome Remote Desktop

remotedesktop.google.com/access

Google Chrome Remote Desktop

Remote Access Remote Support

Remote devices

kaliKali
Online

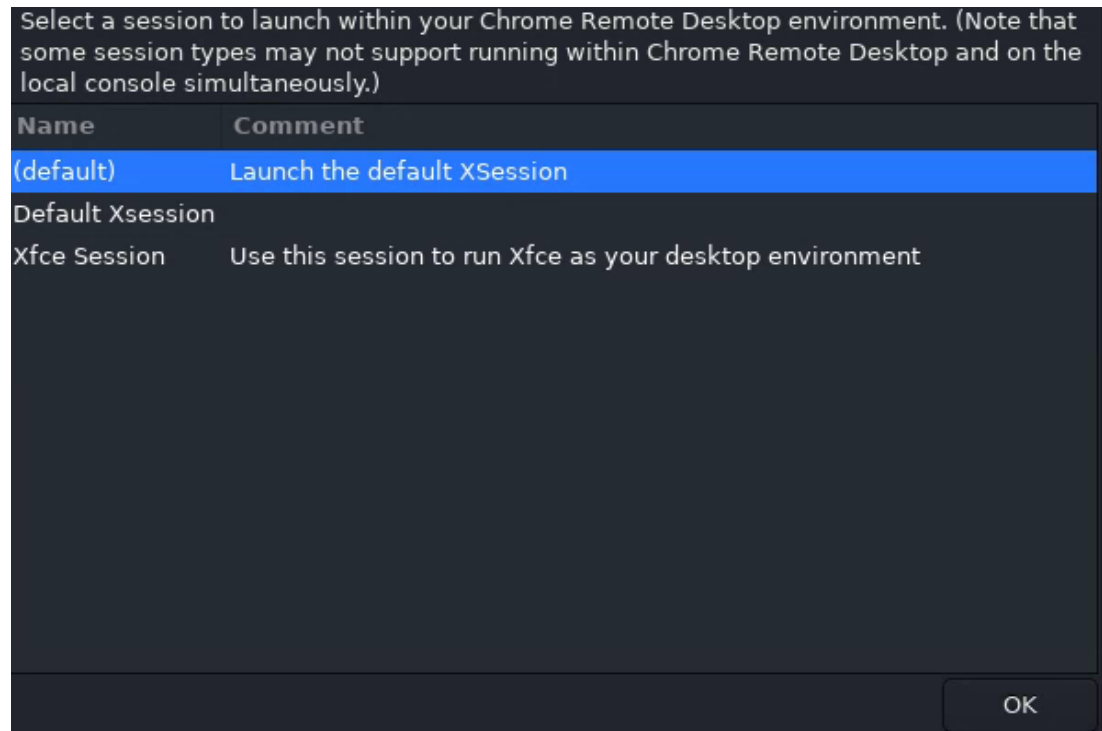
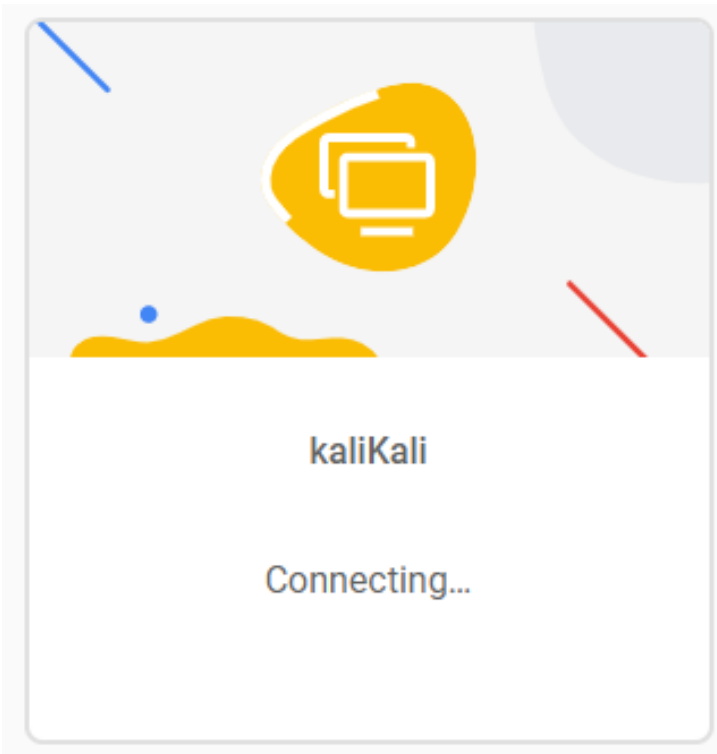
This device

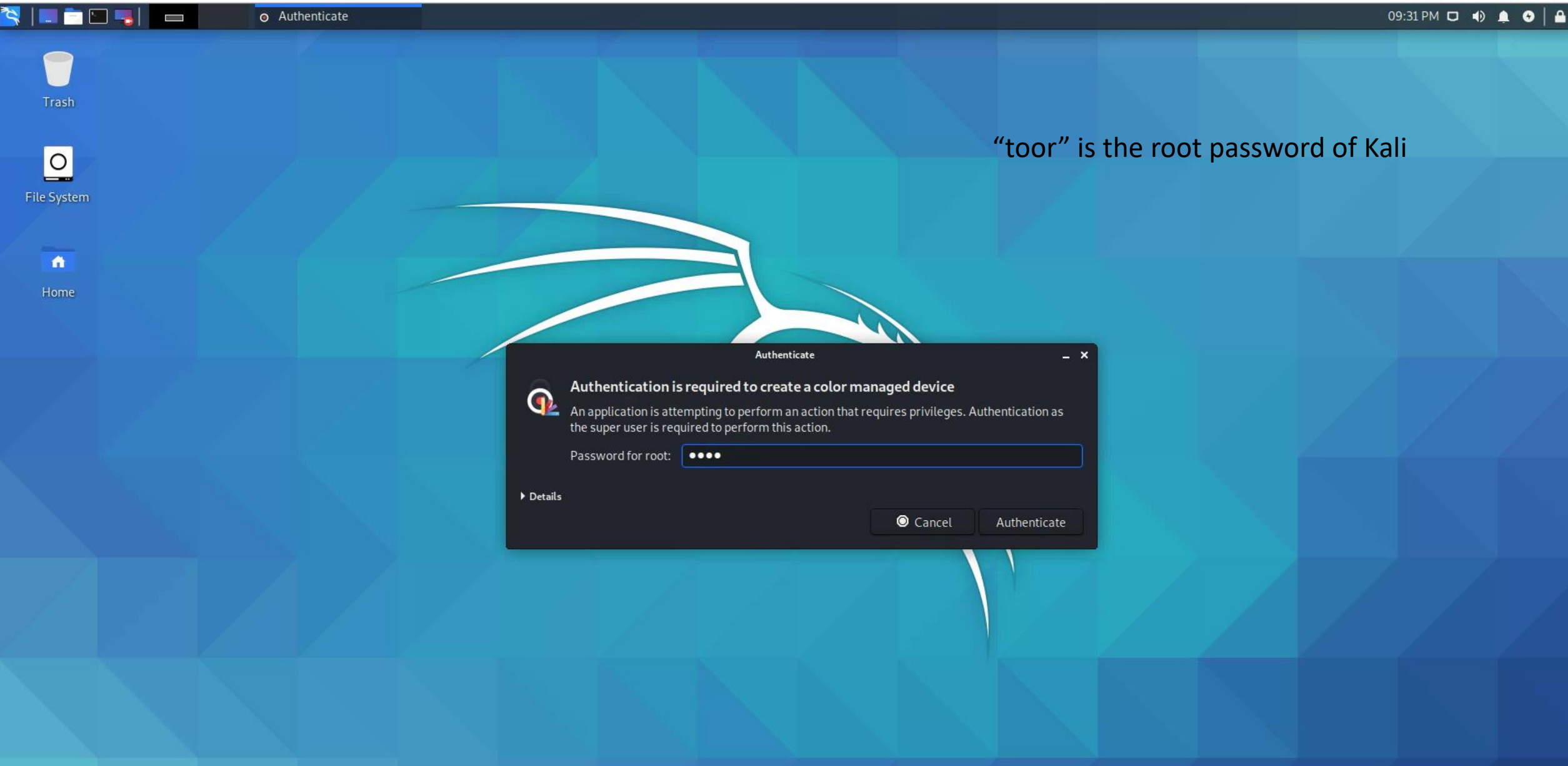
Set up remote access

kaliKali

Enter PIN

Remember my PIN on this device.





“toor” is the root password of Kali

Authenticate

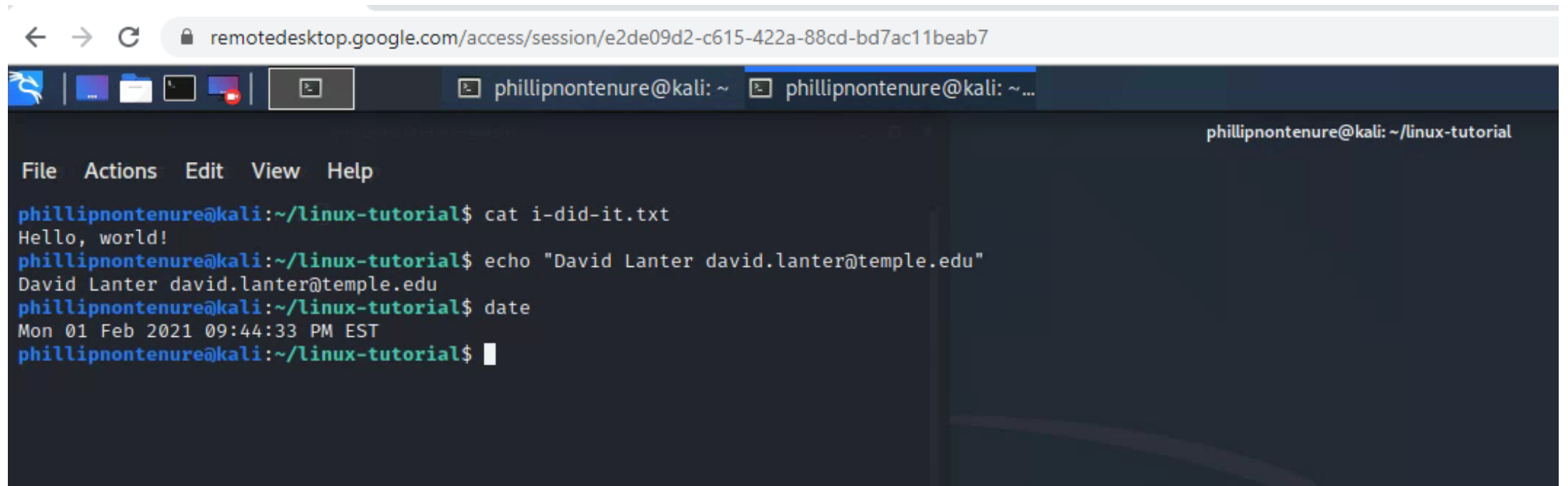
Authentication is required to create a color managed device

An application is attempting to perform an action that requires privileges. Authentication as the super user is required to perform this action.

Password for root:

▸ Details

Complete introduction to Linux tutorial



The screenshot shows a remote desktop session in a web browser. The address bar displays the URL: `remotedesktop.google.com/access/session/e2de09d2-c615-422a-88cd-bd7ac11beab7`. The desktop environment includes a taskbar with icons for a terminal, file manager, and other applications. Two terminal windows are open, both showing the user `phillipnontenure@kali` in the `~/linux-tutorial` directory. The active terminal window has a menu bar with `File`, `Actions`, `Edit`, `View`, and `Help`. The terminal output shows the following sequence of commands and results:

```
phillipnontenure@kali:~/linux-tutorial$ cat i-did-it.txt
Hello, world!
phillipnontenure@kali:~/linux-tutorial$ echo "David Lanter david.lanter@temple.edu"
David Lanter david.lanter@temple.edu
phillipnontenure@kali:~/linux-tutorial$ date
Mon 01 Feb 2021 09:44:33 PM EST
phillipnontenure@kali:~/linux-tutorial$
```

Setup Budget Alerts

Compute Engine

VM instances CREATE INSTANCE IMPORT VM REFRESH MANAGE ACCESS SHOW INFO PANEL

- Virtual machines
 - VM instances
 - Instance templates
 - Sole-tenant nodes
 - Machine images
 - TPUs
 - Migrate for Compute Engi...
 - Committed use discounts
- Storage
 - Disks
 - Snapshots
 - Images
- Instance groups
 - Instance groups
 - Health checks
- VM Manager
 - OS patch management

Filter VM instances Columns

| Name | Zone | Recommendation | In use by | Internal IP | External IP | Connect |
|---------------|---------------|----------------|-----------|-------------------|-------------|---------|
| kali-linux-vm | us-central1-a | | | 10.128.0.2 (nic0) | None | SSH |

Related Actions

- View Billing Report**
View and manage your Compute Engine billing
- Monitor VMs**
View outlier VMs across metrics like CPU and Network
- Explore VM Logs**
View, search, analyze, and download VM instance logs
- Setup Firewall Rules**
Control traffic to and from VM instance

- Start / Resume
- Stop
- Suspend
- Reset
- Delete
- View network details
- New machine image
- View logs
- View monitoring

Stopping VM instance "kali-linux-vm" succeeded. X

Agenda

- ✓ 100 Digits of Pi Quiz
- ✓ Short history of computers, Unix and Linux
- ✓ Tutorial: Introduction to the Google Cloud Platform
- ✓ Upcoming assignments