

**A
PROJECT REPORT
ON**

**NETWORK WIDE ADBLOCKER USING
RASPBERRY PI**

Submitted by

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Under the guidance of

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ELECTRONICS AND TELECOMMUNICATION ENGINEERING

**WALCHAND INSTITUTE OF TECHNOLOGY,
SOLAPUR
2021-22**

CERTIFICATE

This is to certify that project entitled

NETWORK WIDE ADBLOCKER USING RASPBERRY PI

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**ELECTRONICS AND TELECOMMUNICATION ENGINEERING
WALCHAND INSTITUTE OF TECHNOLOGY,
SOLAPUR
2021-22**

ACKNOWLEDGEMENT

The project has certainly enlightened us with the modern era of technologies & it has boosted our confidence. The project work has certainly rendered us tremendous learning as well as practical experience.

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Submitted By:
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INDEX

Chapter No.		Name of Chapter	Page No
		Abstract	6
Chapter 1		Introduction	
	1.1	Introduction	7
	1.2	Need / Purpose of the project	8
Chapter 2		Literature Survey	
	2.1	Literature Survey	9
	2.2	Problem Statement	9
	2.3	Objectives	9
	2.4	Scope of the project	10
Chapter 3		System Description	
	3.1	System Description (Block diagram / Flow chart with explanation)	11
	3.2	Details of methodology/ Algorithms/ concepts used.	16
Chapter 4		Hardware and Software Components	31
Chapter 5		Project Implementation	32
Chapter 6		Results and Discussions	34
Chapter 7		Advantages, Disadvantages and Applications	36
Chapter 8		Conclusion and Future Scope	
	8.1	Conclusion	37
	8.2	Future Scope	37
Chapter 9		Budget details of Project	38
		Bibliography	39
		Appendix	40

List of figures

Figure No.	Title of Figure	Page No.
1	System Flow Diagram	9
2	Pi-hole	10
3	Raspberry pi	12
4	Raspbian OS	14

ABSTRACT

This study is aimed to design an ad-blocker which runs widely on the entire network and block the ads from the web pages of any internet site. To define it properly, a small computer with a SoC (System on Chip) which is widely known as Raspberry Pi is used to get connected to the home network, the network for which we have to block the ads. Software known as Pi Hole is used to remove the ads which are on the web pages of the home network.

So, after this all the devices like smart-phones, laptops, PCs are connected to current home network. Then these devices are pointed to the Pi and also to the Network Traffic through devices now go through the Pi. So, eventually the ads get filtered out in the Raspberry Pi even before reaching the user's devices.

This setup will only work when your devices are connected to the network on which the Raspberry Pi is running. This decreases the latency and increase the browsing speed of any browser by cutting out the extra data these ads take up while loading a web page. Also the user can additionally add a set of websites or a bunch of web pages to be whitelisted on the Pi Hole software, disabling the ad block over these particular websites or web pages.

CHAPTER 1: INTRODUCTION

1.1 Introduction:

Pi-hole home-based techs, like the inexpensive and energy-efficient Raspberry Pi, to guard all the gadgets on your home network from unwanted content. For parents, Pi-Hole can be used to obstruct certain domains at router level to ensure any youngsters using devices in the home aren't accessing unsuitable material. But for network admins, Pi-Hole can be used as a network monitoring tool as well it can record all DNS queries get transmitted to it so it is possible using the web interface to analyze and review traffic. This can be particularly helpful during any network investigation and it is also possible for Pi -Hole to increase network speed.

The most irritating part which is present in a webpage is the ads. People don't want to waste their time in watching the ads while checking their daily News depend on social media. Ads became the key to earn money for a website owner and people would always want to get rid of those ads. So, instead of employing a third-party ad blocker from an unknown source a project has been designed on an ad blocker which would run widely on the network and block the ads from any website.

Now-a-days hackers publish ads in webpages which provides link to their gateway, where at the times when the ad is clicked, it gets linked to the hacker's website where it will be asked to fill up the private details of the users and by having all those details the hacker can threaten the user. In this case, Ad Blocker plays role in dealing to filter all the ads where the user can work in their stuffs in a cool manner.

The aim of this project is to develop an Network Wide Ad Blocker using Raspberry pi which is capable of blocking all the ads that is published within the websites. Pi hole which is installed within Raspberry pi with the assistance of the pi-hole all the ads will get filtered. The router which is connected to the Raspberry pi, which provides the interconnection to all or any devices connected to it, with having the Raspberry pi connected to it all the ads are filtered in an efficient way that not even a single ad will appear within the website.

1.2 Purpose of Project:

- Block web requests that download content into the browser.
- Adblockers stop ads from downloading on your browser, it allows web pages to load faster and offer a better browser experience.

CHAPTER 2: LITERATURE SURVEY

2.1: Literature Survey:

There are numerous mobile advertising blockers which are present in the form of application center such as Google Play Store and therefore increasing the numerous user related defects which suggest significant ineffectiveness or usability problems, so that in order that to look at unexpected environment is important. The approximate mobile phone user gives positive rating towards using ad blocker in mobile phones though using the presence of malware tools. While taking the survey, Negative reviews of around 16% interconnected itself to the unsuccessful towards the advertisement obstruction applications, they were complaining some of the serious problems in their performances. Besides, our testing of Advertising Blockers, several active problems were occurred at the same time of working some other induced applications or browsing in the browser caused by number of Advertisement blockers such as F secure freedom VPN. These were found by testing the Advertisement blockers from the results or evaluations or the reviews given by the users. The scientists believes that this work will definitely will helps to study the effectiveness of the advertisement blocking. In the complement of providing the Intuition given by our research with an exhaustive set of energetic evaluations to tell the runtime characteristic features of the advertisement blocking applications to be provided as its future work. Future Work to enable UI to the admin and to get the feedback from the users about the ad free network.

2.2: Problem Statement:

To obstruct redundant ads which affects performance and user experience of IOT connected devices over the internet. Design a dashboard for visualizing the sentiment of people across different social.

2.3: Objectives:

- Protecting privacy
- Protecting from malvertising
- Better user experience
- Save battery on mobile devices or laptops
- Prevent undesirable websites from making ad revenue out of the user's visit

2.4: Scope of Project:

- The sentiments can only be captured in English Language.
- Only YouTube and Twitter Social Media sites are supported currently.

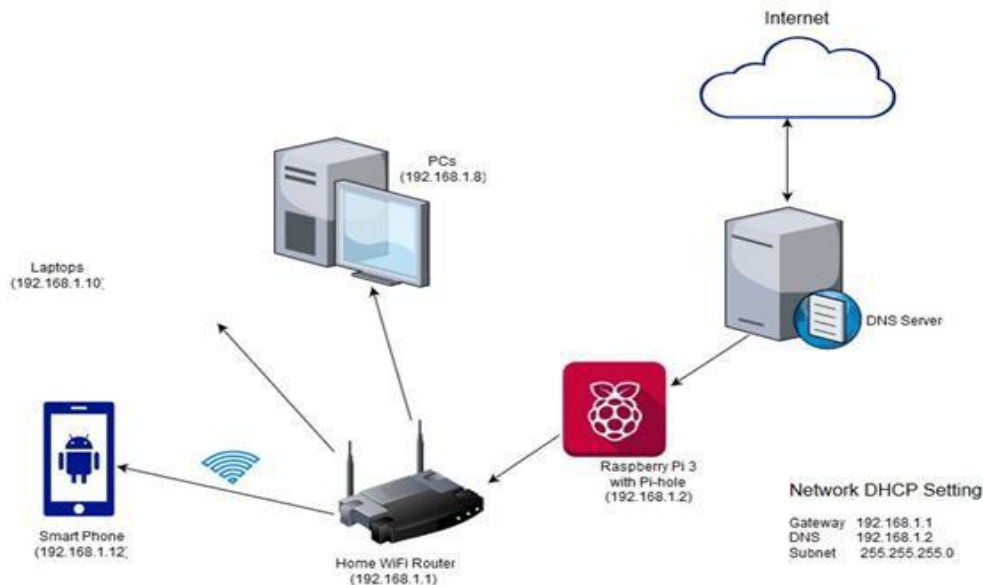
2.5: Limitations of Project:

- Ad Blocker causes web pages to break
- Ad Blocker messes with website analytics
- Ad Blocker prevents you from enjoying quality content
- Ad Blocker causes you to lose your favorite websites

CHAPTER 3: SYSTEM DESCRIPTION

3.1 System Description:

Below flowchart shows the working of the project.



3.1 System Flow Diagram

Pi-hole:

Pi-hole is a network-wide advertisement blocker. Rather than installing adblockers on every device and every browser, we will install Pi-hole once on your network, and it will protect all of your devices. Because it works differently than a browser-based advertisement blocker, Pi-hole also blocks ads in non-traditional places such as in games and on smart TVs.

Pi-hole functions as an internal, private DNS server for your network. For many home users, this service is already running on your router, but your router doesn't know where advertisements are but Pi-hole do knows. Pi-hole will intercept any queries for known ad-serving domains and deny them access, so ads won't be downloaded.

This means websites will load normally but without any advertisements. Since ads are never downloaded, sites will load faster. Pi-hole also caches these queries, so responsiveness to commonly visited websites can also be noticed.



3.2 Pi-hole

The Pi-hole software has very low resource requirements and can even run on a Raspberry Pi Zero W. And despite its name, you can also install Pi-hole on several other Linux distributions. Many users install it on a VM or in a container and let it provide services that way. But since Pi-hole's resource requirements are so low, many users have found it to be a good use of their older, lower-powered model Raspberry Pi's. Simply install Pi-hole, connect the Pi to your router, and begin blocking ads everywhere.

We can also pair Pi-hole with a VPN to get ad blocking via a cellular connection.

This will help us with bandwidth limits and data costs, because your phone won't need to download advertising videos and images.

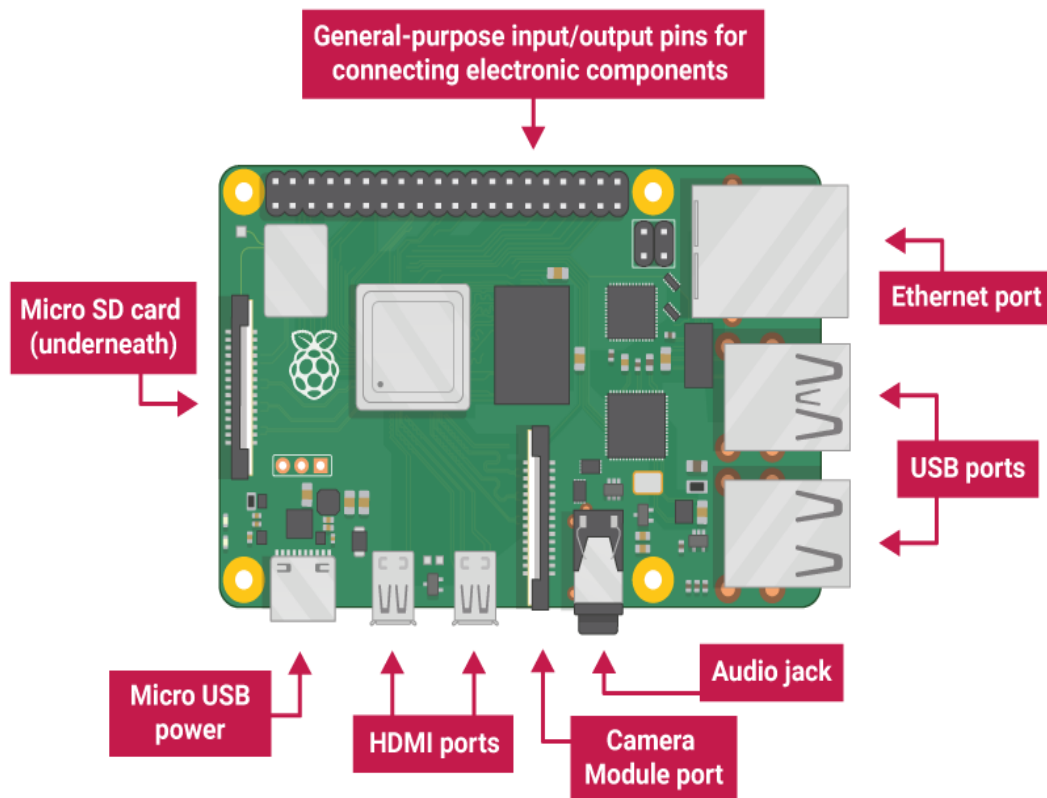
Raspberry Pi:

Raspberry Pi is a small sized board computer. It is connected to peripherals like Keyboard, mouse, display to the Raspberry Pi. It acts like a mini personal computer.

Raspberry Pi is popularly used for real time Image/Video Processing, IoT based applications and Robotics applications.

Raspberry Pi is slower than laptop or desktop but it is still a computer which can provide all the expected features or abilities, at a low power consumption.

Raspberry Pi Foundation officially provides Debian based Raspbian OS. Also, they provide us NOOBS OS for Raspberry Pi. We can install several Third-Party versions of OS like Ubuntu, Archlinux, RISC OS, Windows 10 IOT Core, etc.



3.3 Raspberry pi

Raspberry Pi consists of 40 GPIO pins. USB ports are used to connect mouse and keyboard or other

components such as USB drive. We should use SD card to store the OS (operating System).

Ethernet port is used to connect raspberry pi to a network with a cable and also to connect network via

wireless LAN.

Audio jack is used to connect headphones.

HDMI (High-Definition Multimedia Interface) is used to connect the monitor or projector to display the output from raspberry pi.

Micro USB power is to connect power supply

Raspberry Pi is more than computer as it provides access to the on-chip hardware. We can connect devices like LED, motors, sensors etc by accessing GPIO and can control them too.

It has ARM based Broadcom Processor SoC along with on-chip GPU (Graphics Processing Unit).

We should use SD card (minimum 8 GB recommended) to store the OS (operating System).

Raspberry Pi is more than computer as it provides access to the on-chip hardware i.e. GPIOs for developing an application. By accessing GPIO, we can connect devices like LED, motors, sensors, etc and can control them too.

Raspberry Pi also provides on-chip SPI, I2C, I2S and UART modules.

There are different versions of raspberry pi available as listed below:

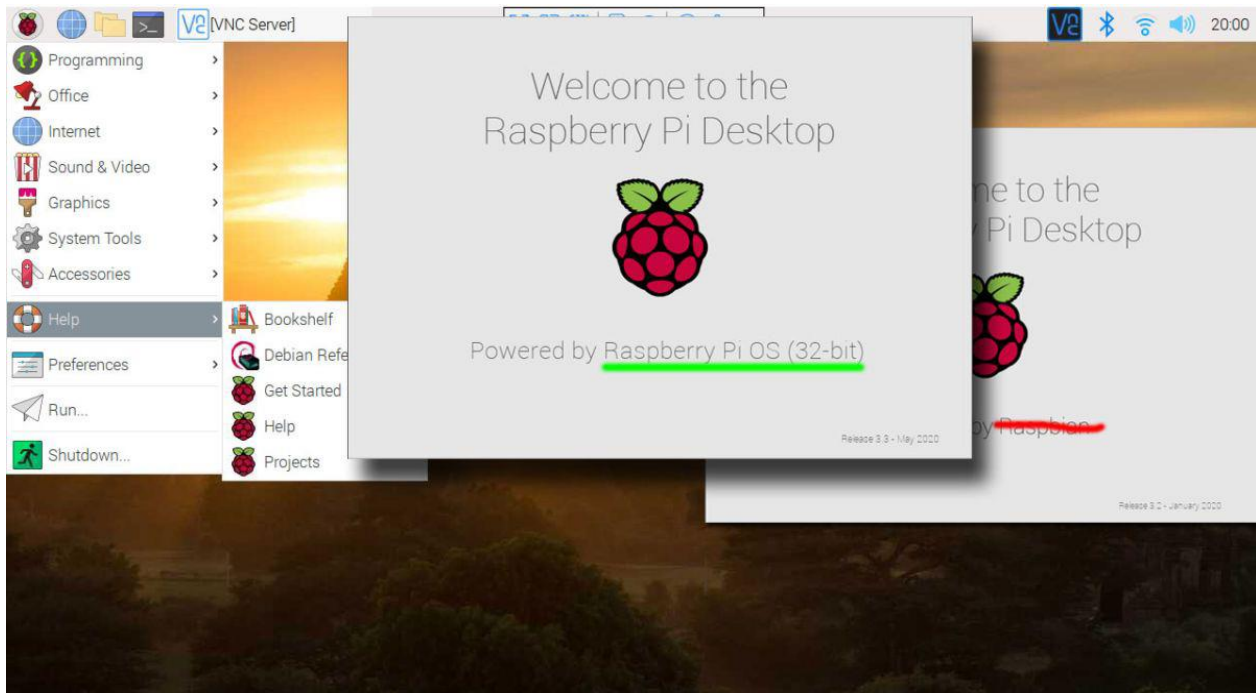
1. Raspberry Pi 1 Model A
2. Raspberry Pi 1 Model A+
3. Raspberry Pi 1 Model B
4. Raspberry Pi 1 Model B+
5. Raspberry Pi 2 Model B
6. Raspberry Pi 3 Model B
7. Raspberry Pi Zero

Raspbian OS:

Raspberry Pi OS (formerly Raspbian) is a Debian-based operating system for Raspberry Pi.

Since 2015, it has been officially provided by the Raspberry Pi Foundation as the primary operating system for the Raspberry Pi family of compact single-board computers. The first version of Raspbian was created by Mike Thompson and Peter Green as an independent project.

The initial released build was completed on July 15, 2012.



3.4 Raspbian OS

Raspberry Pi OS is highly optimized for the Raspberry Pi line of compact single-board computers with ARM CPUs. It runs on every Raspberry Pi except the Pico microcontroller. Raspberry Pi OS uses a modified LXDE as its desktop environment with the Openbox stacking window manager, along with a unique theme.

Raspberry Pi OS has 3 installation options with 2 64-bit options:

- Raspberry Pi OS Lite 32-bit & 64-bit
- Raspberry Pi OS 32-bit & 64-bit
- Raspberry Pi OS Full 32-bit

Raspberry Pi OS Lite is the smallest version and doesn't include a Desktop Environment.

Raspberry Pi OS includes the Pixel Desktop Environment.

Raspberry Pi OS Full also comes pre-installed with additional productivity software.

All versions are distributed as .img disk image files. These files can then be flashed on to microSD cards where Raspberry Pi OS runs. In March 2020, the Raspberry Pi Foundation also published the Raspberry Pi Imager, a custom disk flasher that allows for the installation of Raspberry Pi OS as well as other operating systems designed for the Raspberry Pi, including RetroPie, Kodi OS, and others.

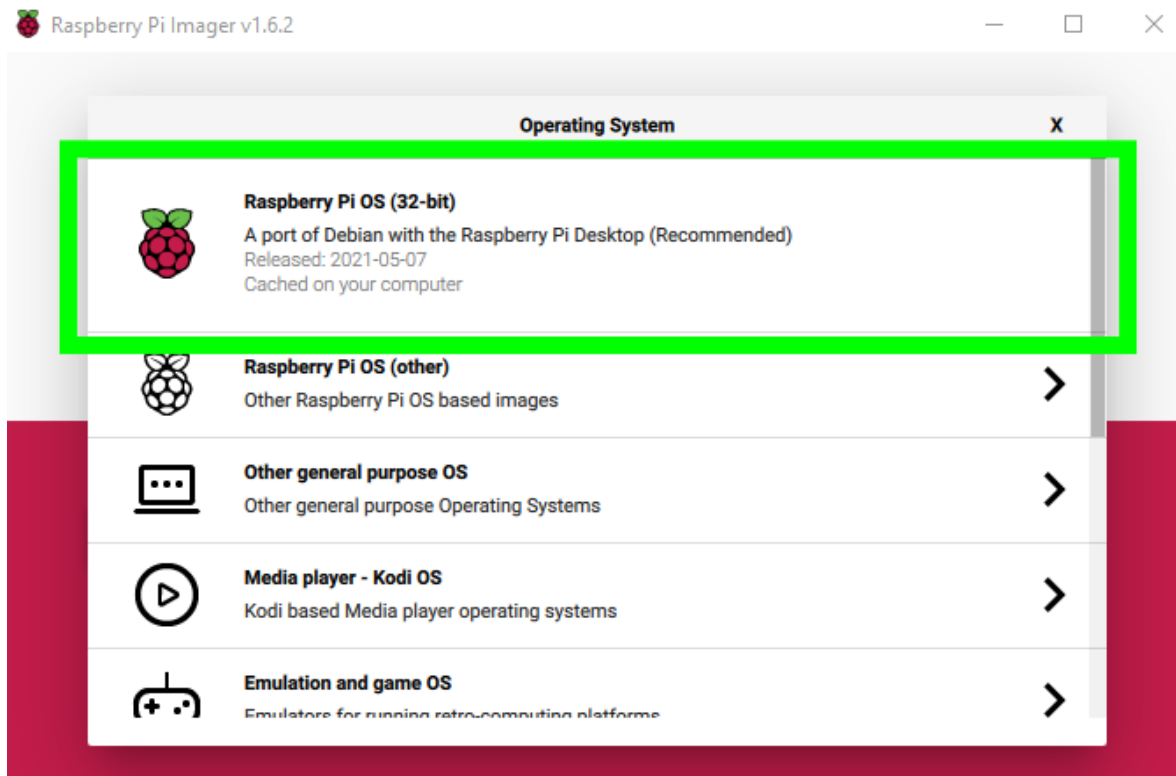
Putty:

PuTTY is a popular SSH, Telnet, and SFTP client for Windows. It is typically used for remote access to server computers over a network using the SSH protocol.

3.2 Details of Methodology:

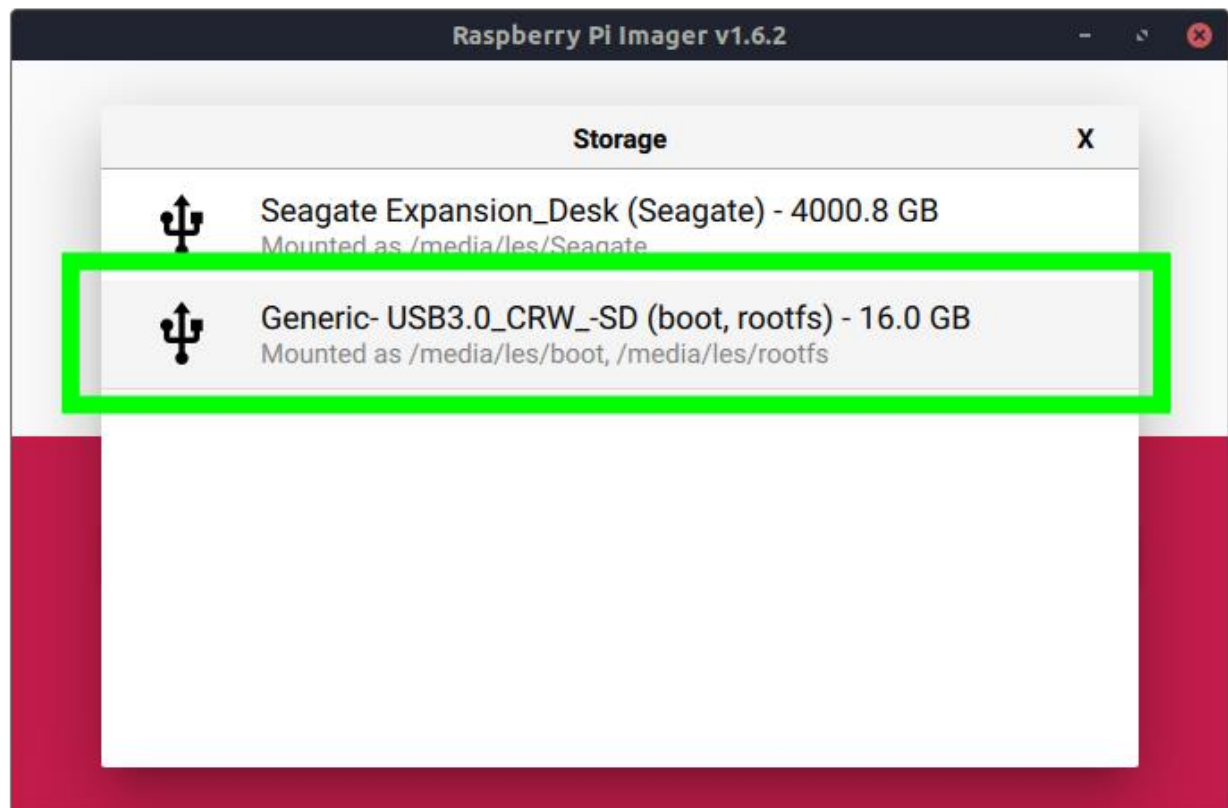
A software is designed in such a way that it is capable of blocking all the ads that is published in the websites. Pi hole which installed in the Raspberry pi with the help of the pi hole all the ads will get filtered. The first thing is needed to do is download and burn the Pi Hole image. The image is a version of a Raspberry Pi operating system called Diet Pi, which cuts a lot of junk from Raspbian, and is packed with all the software needed to run the ad blocker. Insert the SD card into the Raspberry Pi and connect the keyboard. Connect the Ethernet cable to the WiFi router, then plug in the Raspberry Pi, and wait for it boot. Once the Raspberry Pi is running the Pi-Hole software, still need to route devices traffic through it so ad blocking works. To do this, one need to change the device's DNS settings. This way, the devices ping the Pi to block ads as long as the same network remains constant. This is pretty simple, but varies depending on the devices and what the software is running. A user can have software to block ads on a computer, but if any user want to block ads on all devices— from smartphone to the tablets— need something a little stronger. Enter the Pi-Hole, a Raspberry Pi image that blocks ads of all sorts at the router level.

Step 1:- Download Raspbian OS and Raspbian Imager.



Step 2:- Flash the OS in SD card Through Raspbian Imager.

Insert a microSD card reader into computer. We should note that this microSD card will be erased. After that run Raspbian Imager where you get two options: choose OS and choose storage.



After that click on choose OS and there you get many options like Raspberry Pi OS (32-bit), Raspberry Pi OS(Other), LibreELEC, Ubuntu, RetroPie from that we have to select Raspberry Pi OS (32-bit).

Under Storage click on the button you get two options such as Seagate Expansion_Desk (Seagate)-4000.8 GB and Generic-USB3.0_SD(boot, rootfs)-16 GB and **select** Generic-USB3.0_SD(boot, rootfs)-16 GB microSD card.

After that write option will be available and click on write.



Step 3:- Create SSH file in the boot directory.

Note that the extension of the above file is empty.

Create a file with name “ wpa_supplicant.conf ”.

In the above file add username and password for wifi connection.

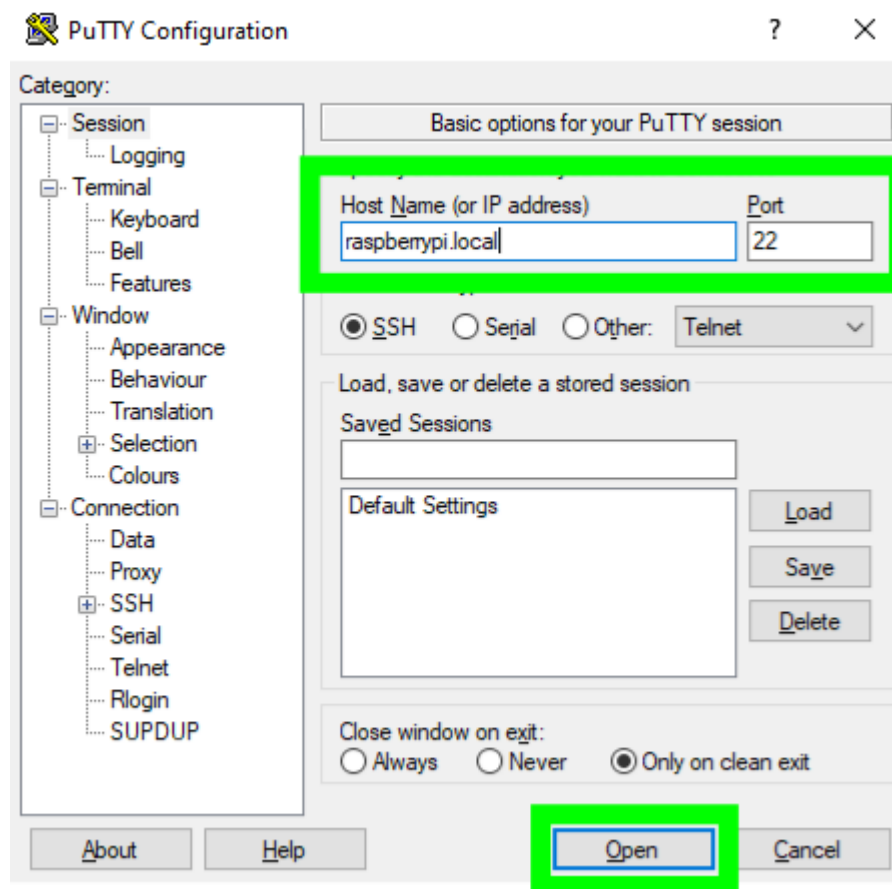
SSH: SSH, also known as Secure Shell or Secure Socket Shell, is a network protocol that gives users, particularly system administrators, a secure way to access a computer over an unsecured network.

Step 4:- Boot the Raspberry Pi wait for the connection.

Step 5:- SSH, a secure connection to your Raspberry Pi, is the best way to install and setup Pi-hole. We can use an SSH client to connect. For Windows this is PuTTY, and Mac, Linux users can directly connect via the terminal. With SSH we can install software and administrate the Raspberry Pi as if we were sitting in front of it.

1. Windows users, download and install PuTTY. Linux and Mac users can directly open a terminal.

2. Via PuTTY enter the hostname as raspberrypi.local (on some networks, this is just raspberrypi without the .local) and then click Open.



Login as : Pi
Password : raspberry

Step 6:- Update your software repositories and then download the latest updates for your Raspberry Pi. Now enter Two commands

- i) \$ Sudo apt update
- ii) \$ Sudo apt upgrade -y

SUDO: The sudo command allows you to run programs with the security privileges of another user (by default, as the superuser). It prompts you for your personal password and confirms your request to execute a command by checking a file, called sudoers , which the system administrator configures.

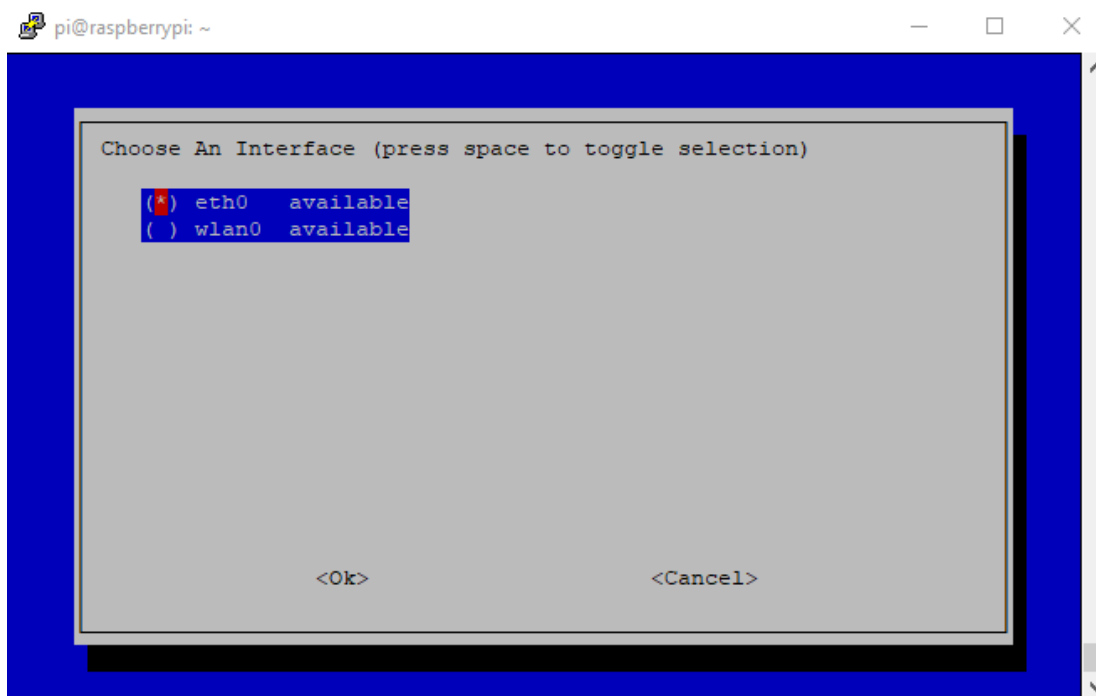
Step 7:- Install Pi-Hole using this one-line installation script. This command will download the script and then run the installer in the terminal.

“ curl -sSL <https://install.pi-hole.net> | bash ”

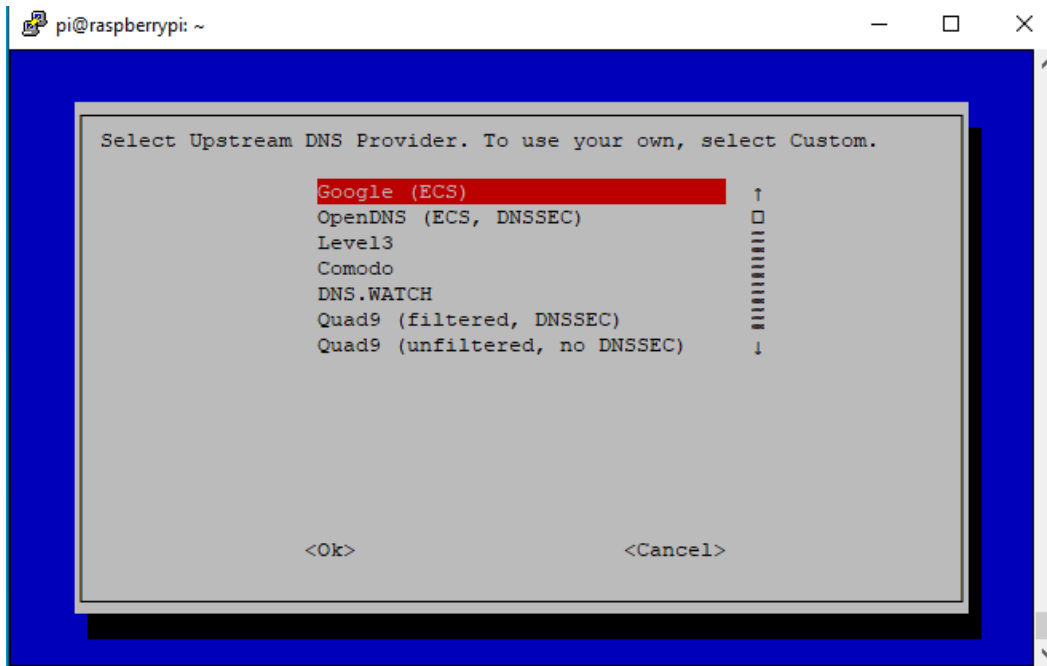
The Pi-hole installer will start by updating the available software, and then a menu-based installation wizard will start. Press Enter to progress through the installation.

CURL: curl (short for "Client URL") is a command line tool that enables data transfer over various network protocols. It communicates with a web or application server by specifying a relevant URL and the data that need to be sent or received. curl is powered by libcurl, a portable client-side URL transfer library.

Choose eth0 as the interface to use with Pi-hole. Press Tab to move the red highlight to Ok and then press Enter

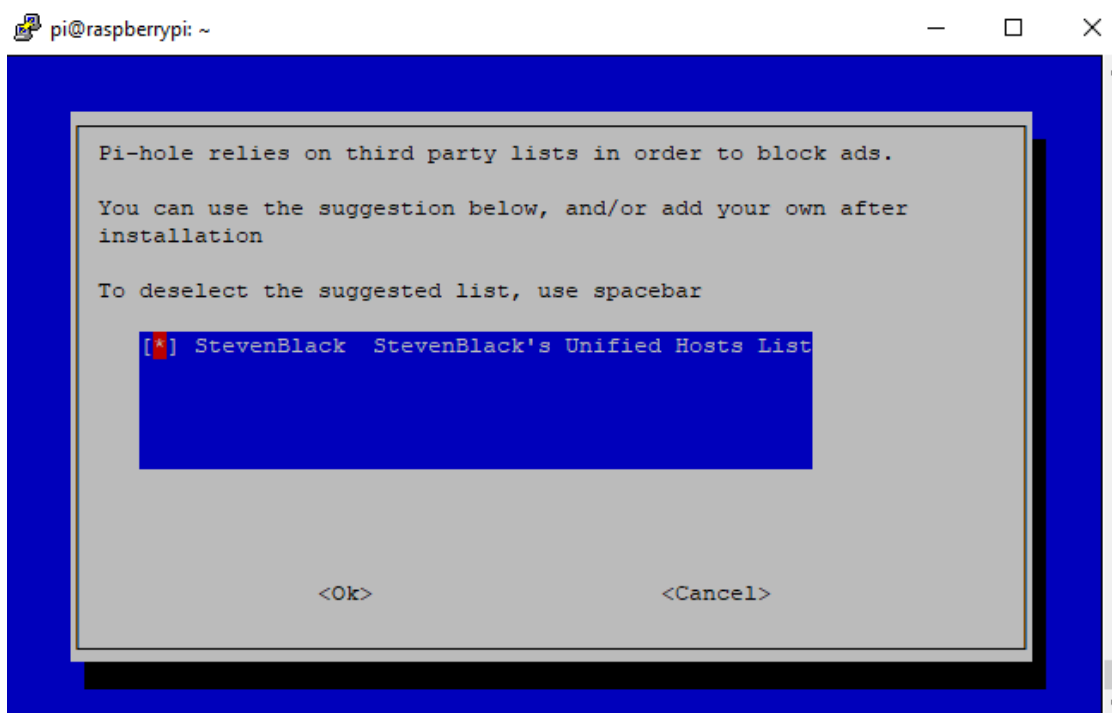


Select your upstream DNS provider. To use your own for that we have Google(ECS), OpenDNS(ECS, DNSSEC), Level3, Comodo, DNS.WATCH, Quad9(filtered, DNSSEC), Quad9(unfiltered, no DNSSEC) in that choose Google and press enter.

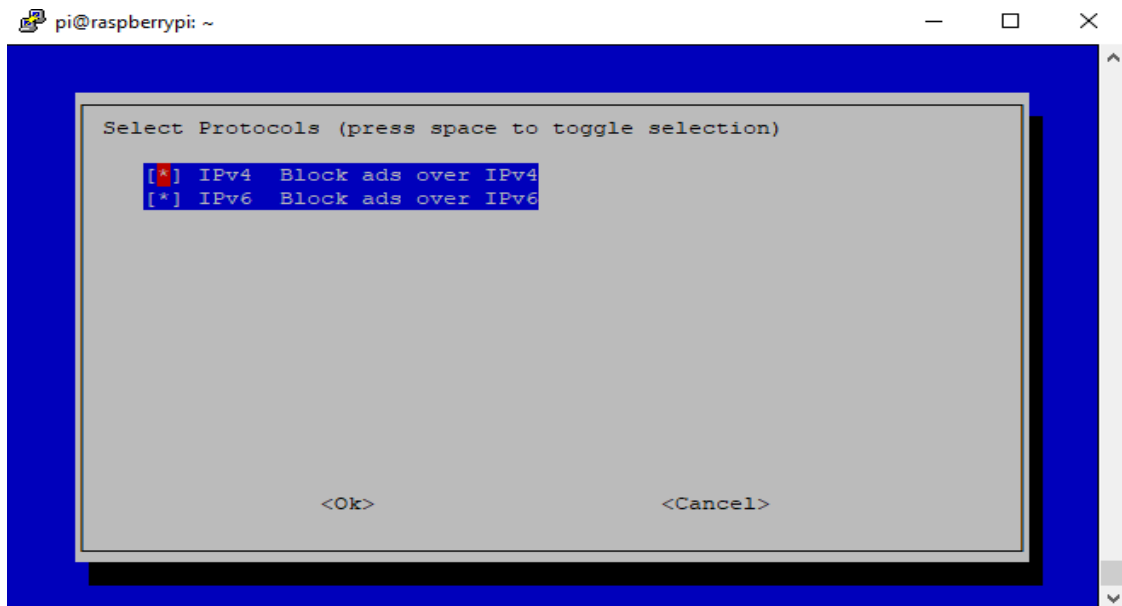


The below image shows us the installation process of Pi hole. By accepting the default list of blocked sites further pressing tab and enter.

ETHERNET/ETH: Ethernet is the traditional technology for connecting devices in a wired local area network (LAN) or wide area network (WAN). It enables devices to communicate with each other via a protocol, which is a set of rules or common network language.



Now further we need to accept the default IPv4 and IPv6 protocols by pressing tab and enter as shown in below image.



Now we have to accept the current network settings, and set them as static as IP address: 192.168.0.34/24 and Gateway: 192.168.0.1

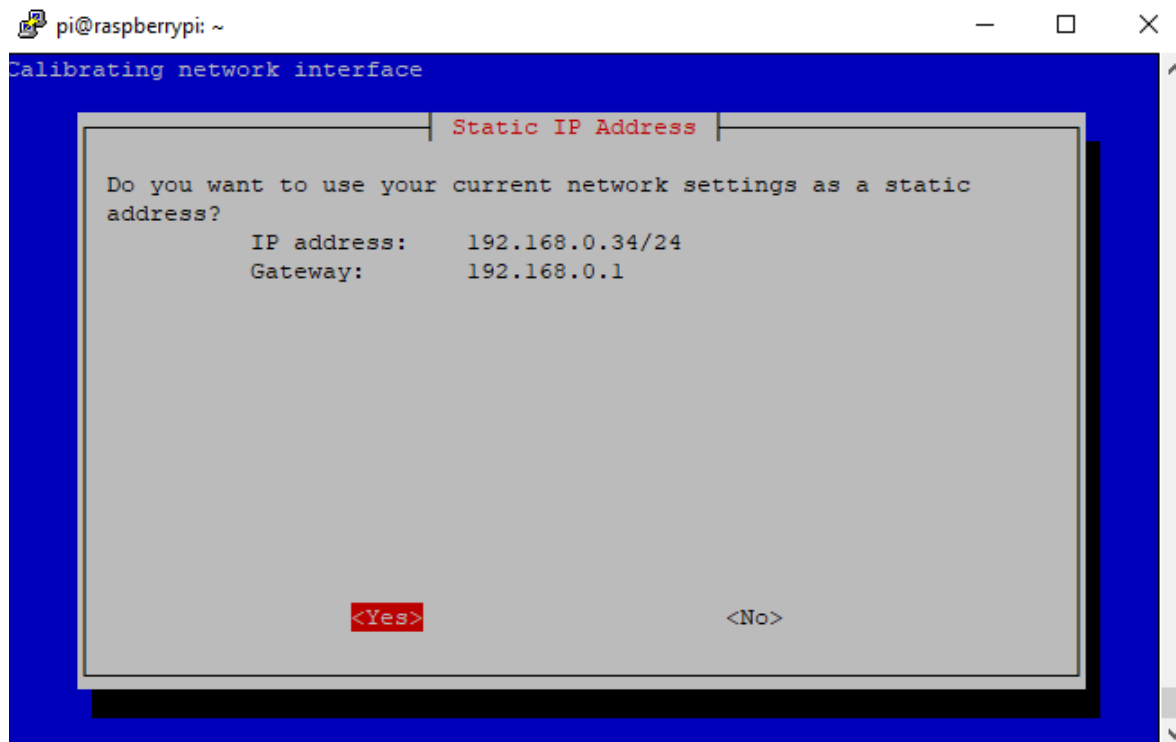
Press <Yes> then enter.

IPV4:

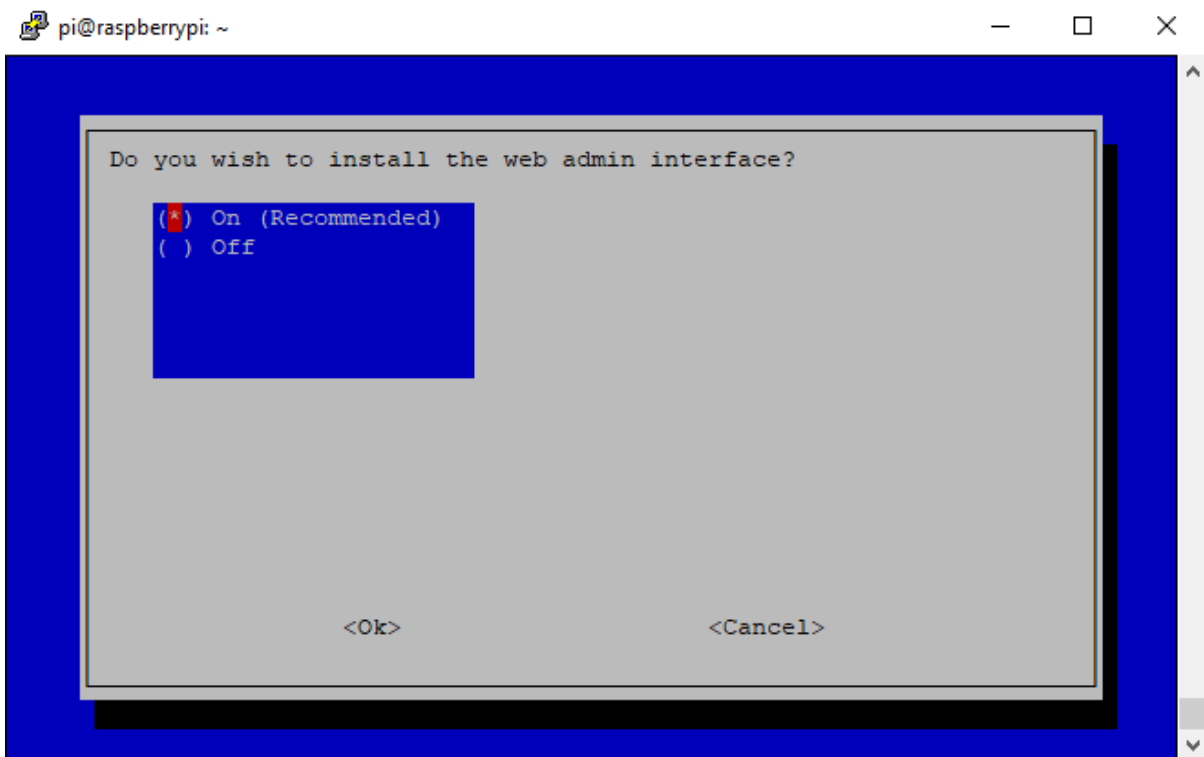
Internet Protocol version 4 (IPv4) is the fourth version of the Internet Protocol (IP). It is one of the core protocols of standards-based internetworking methods in the Internet and other packet-switched networks.

IPV6:

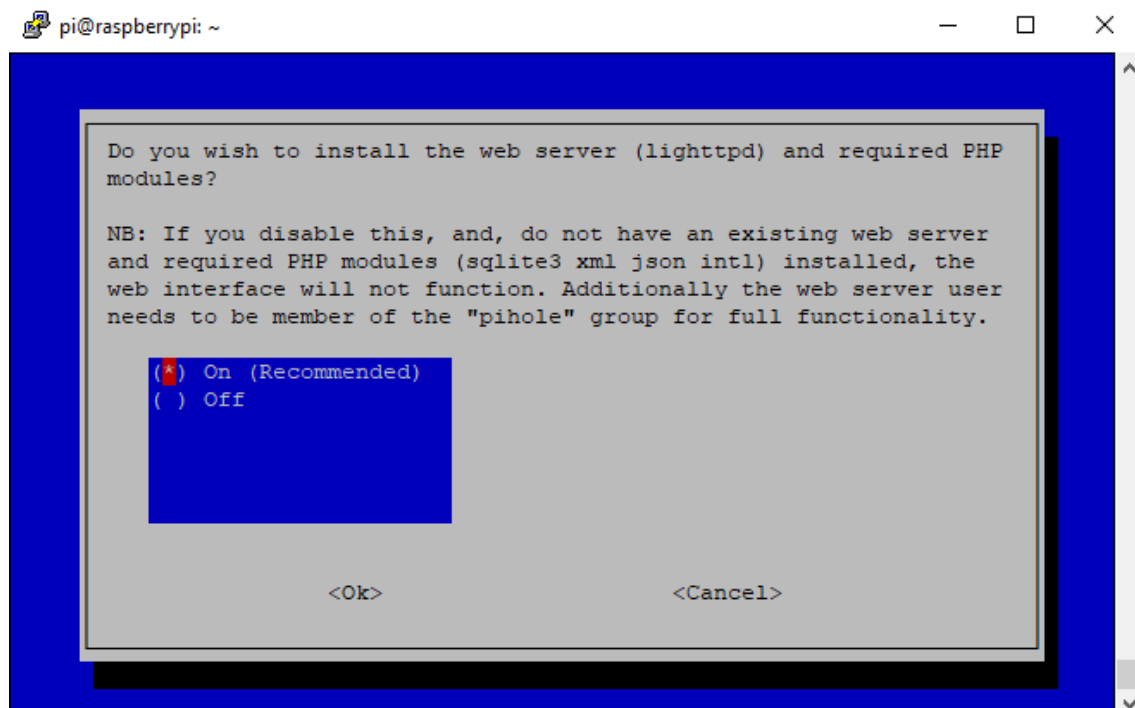
Specifies the IPv6 maximum transmission unit (MTU) for the Ethernet interface. Specifies the default IPv6 hop limit value (that is, the number of routers through which a datagram will travel) for the Ethernet interface. Enables or disables IPv6 PING on the specified Ethernet interface



Install the web admin interface by pressing tab and enter.

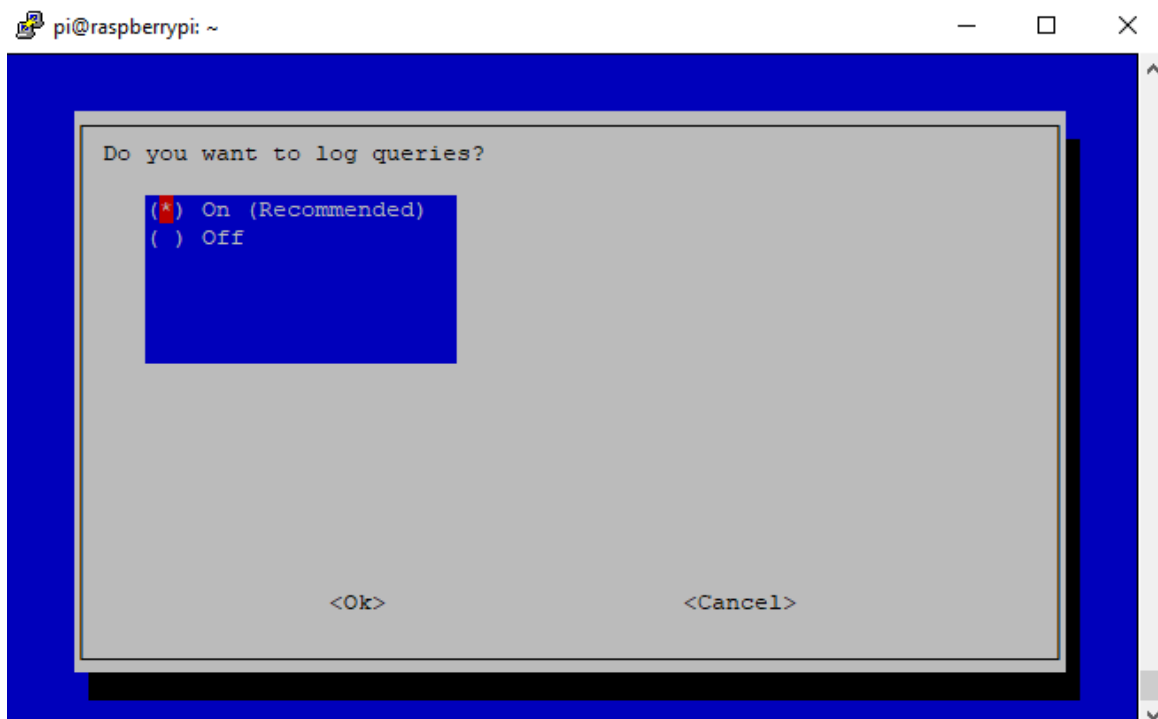


Now we have to install the lighttpd web server used to serve the web admin pages by pressing tab and enter.



Accept the default log options.

Lighttpd server: Lighttpd is a terribly little and extremely economical web server. It's a straightforward and powerful various to IIS and Apache net servers. you'll be able to see some benchmarks on Lighttpd benchmark page. There square measure links to alternative tests on this page therefore developers are pretty honest concerning Lighttpd performance.

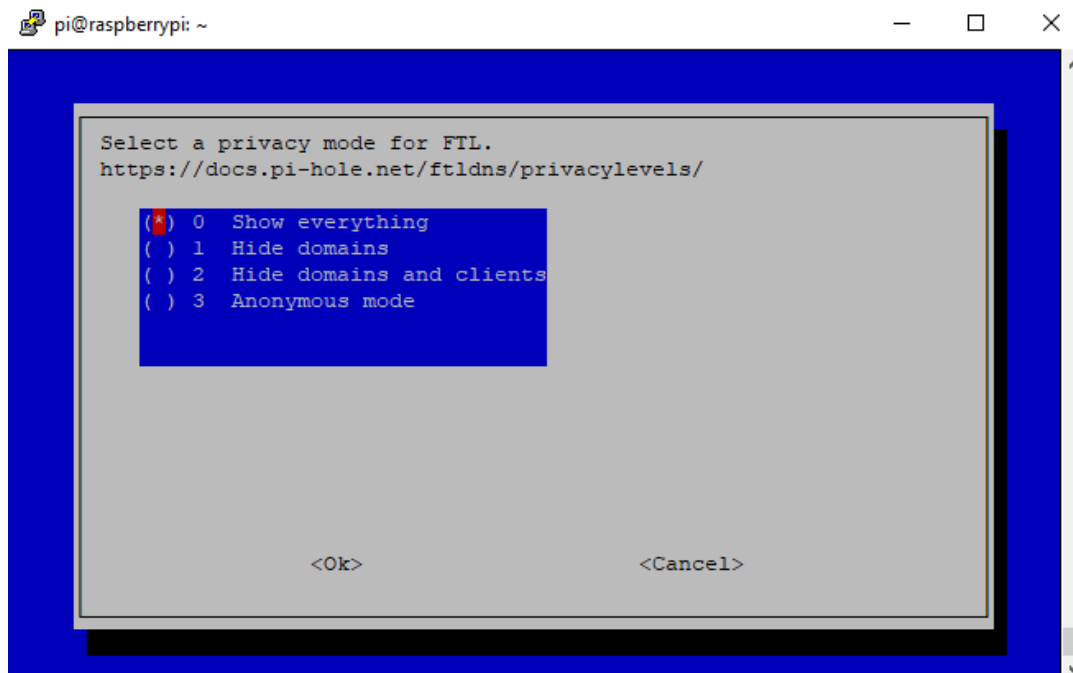


Select a privacy mode for FTL. <https://docs.pi-hole.net/ftldns/privacylevels/>

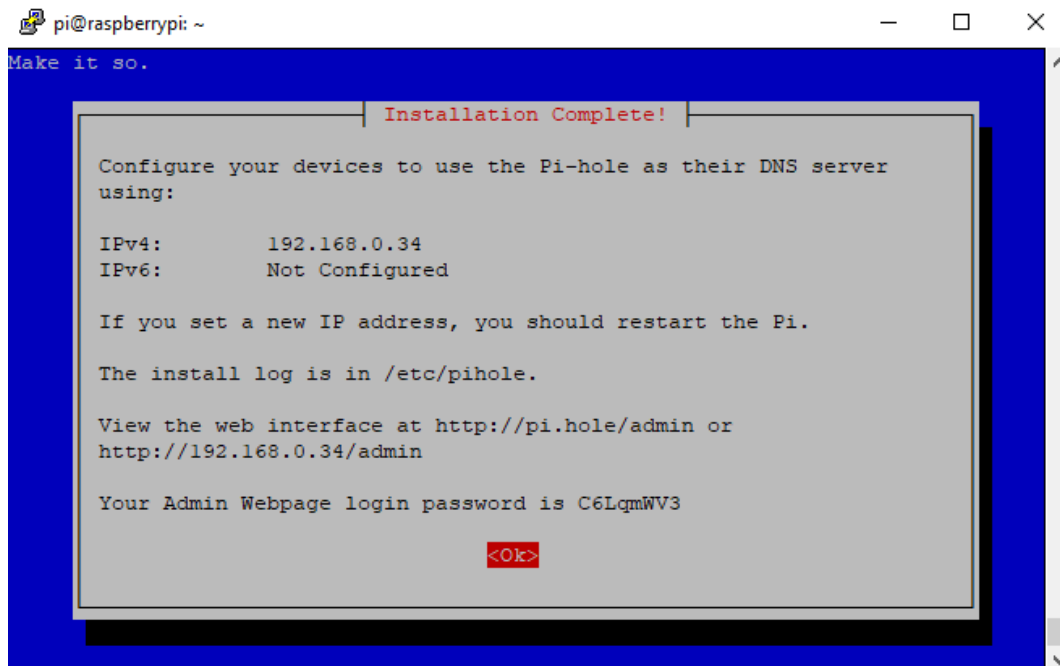
- (A) Show everything ()
- (B) Hide domains ()
- (C) Hide domains and clients ()
- (D) Anonymous mode

Now we have to accept the default privacy mode pressing tab and enter.

<Ok> <Cancel>

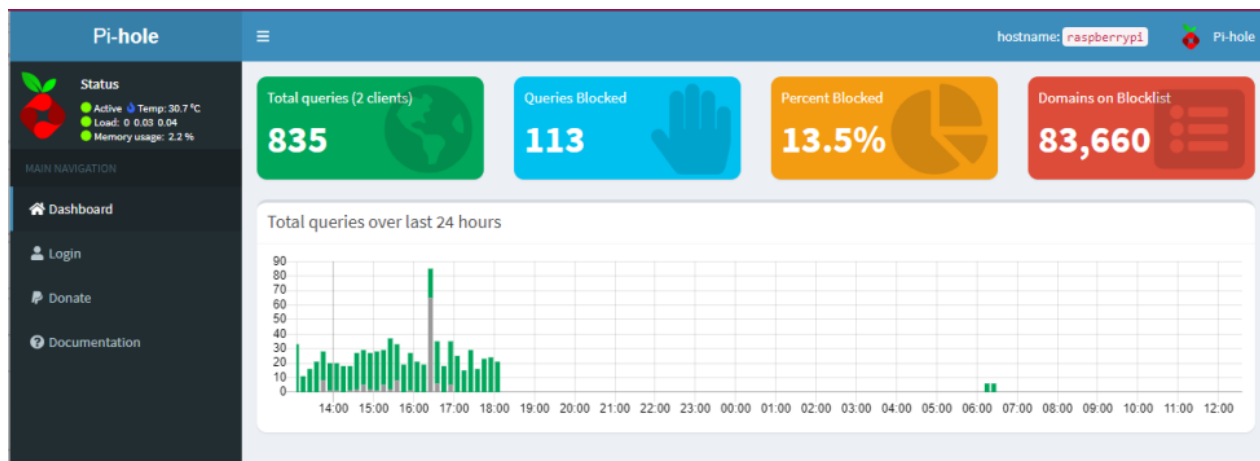


The installation is complete and the final page recaps the IP address of the Pi-hole device and provides an admin webpage login password.



Step 8:- After installing the Pi-Hole we have to change the password of web interface, This can be achieved by using command “pihole -a -p”

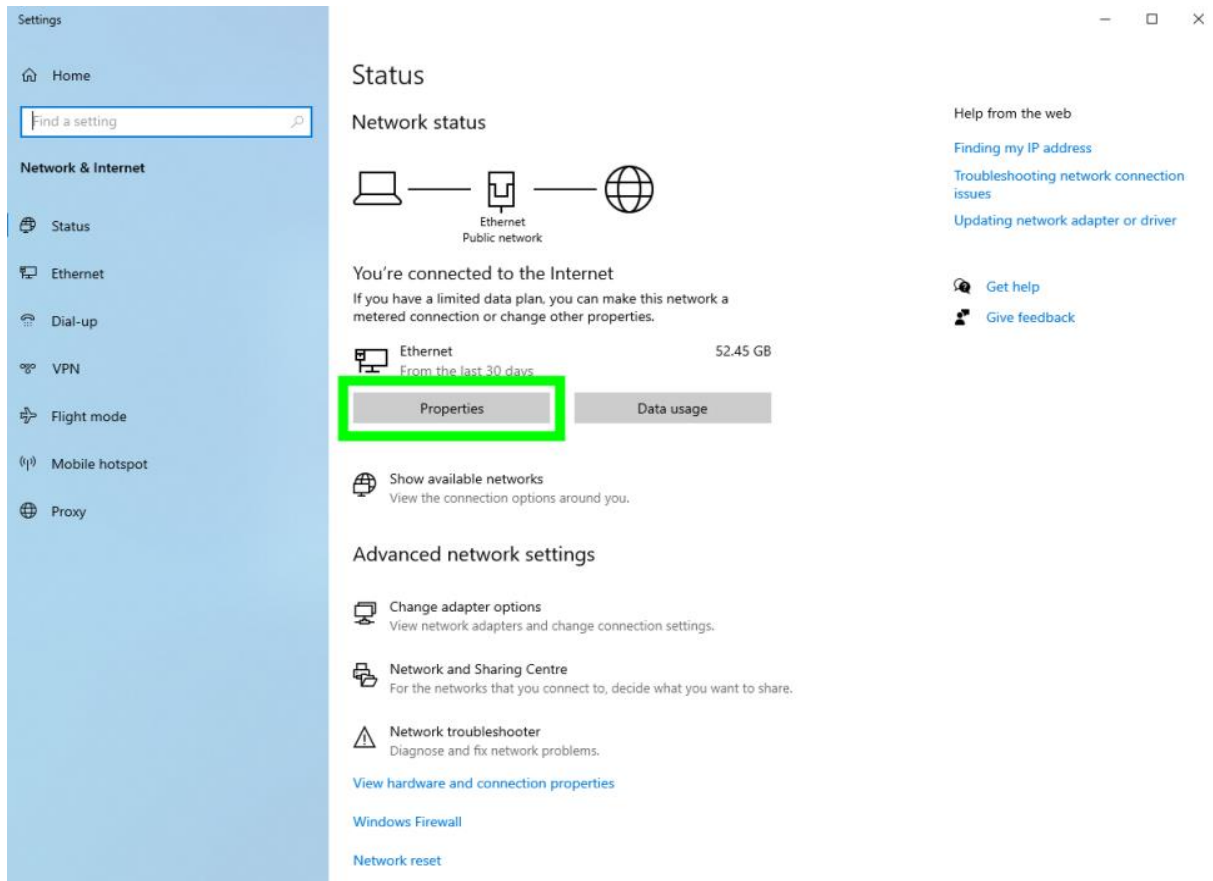
Step 9:- Now, open pi-hole in browser using IP address provided.



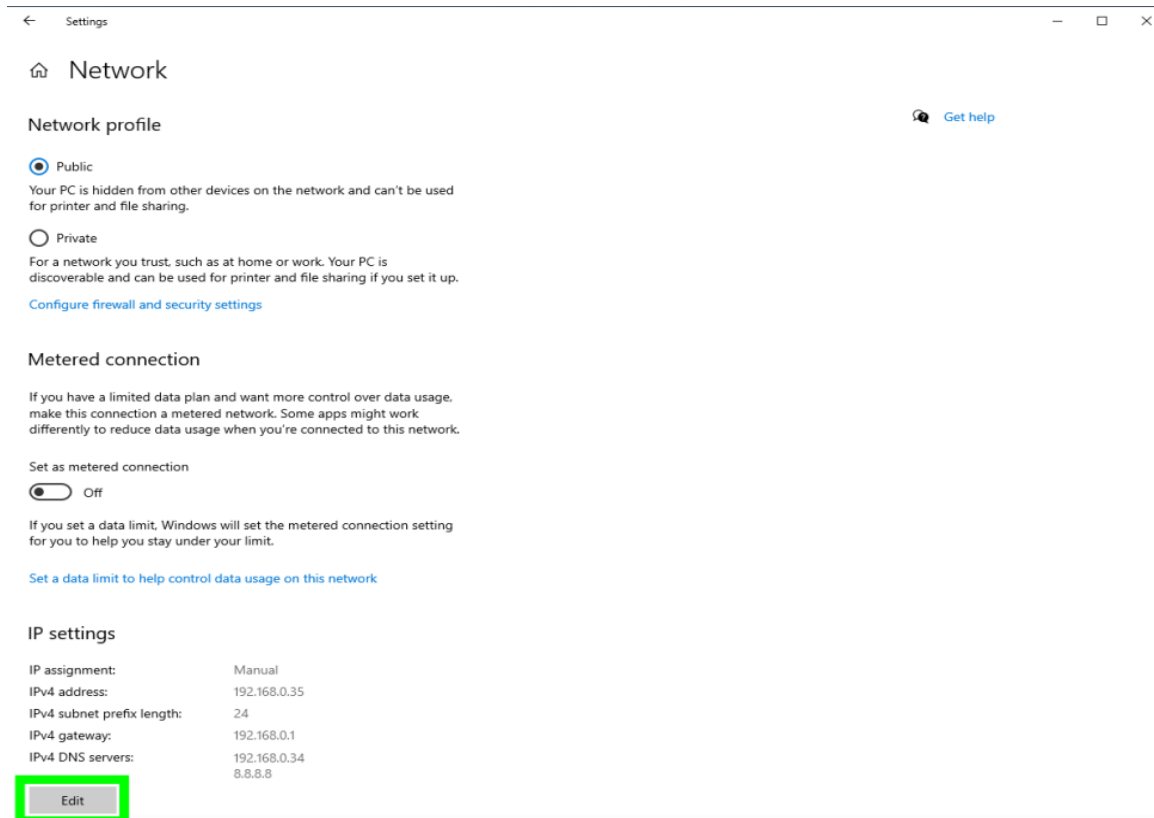
Step 10:- With our Raspberry Pi running Pi-hole setup and running we now need to point our devices to it so that Pi-hole’s DNS servers can block unwanted advertisements. Here we are setting up a wired network connection with Windows 10.

Configure DNS address of the device and set it to the IP address provided by Pi-hole.

Right click on the Windows logo and select Network Connections and then click on Properties.



Click on Edit to update the network configuration.



Edit your IP address to your desired address. We chose to stick with what the router's DHCP server issued. Set the Subnet prefix length to 24. The Gateway is the IP address of the router, in our case 192.168.0.1. Preferred DNS is our Pi-hole DNS server, 192.168.0.24. The Alternative DNS is used if our Pi-hole device goes offline, in this case it is Google's DNS server. Click Save to write the changes and restart the network interface.

SUBNET: A subnet, or subnetwork, is a network inside a network. Subnets make networks more efficient. Through subnetting, network traffic can travel a shorter distance without passing through unnecessary routers to reach its destination.

GATEWAY: A gateway is a node (router) in a computer network, a key *stopping point* for data on its way to or from other networks.

Edit IP settings

Manual

IPv4

☒ On

IP address

192.168.0.35

Subnet prefix length

24

Gateway

192.168.0.1

Preferred DNS

192.168.0.34

Alternative DNS

8.8.8.8

IPv6

☐ Off

Save Cancel

DNS: The Domain Name System (DNS) is the phonebook of the Internet. Humans access information online through domain names, like nytimes.com or espn.com. Web browsers interact through Internet Protocol (IP) addresses. DNS translates domain names to IP addresses so browsers can load Internet resources.

Thus, we have detailed methodology for our project.

CHAPTER 4: COMPONENTS:

Hardware components

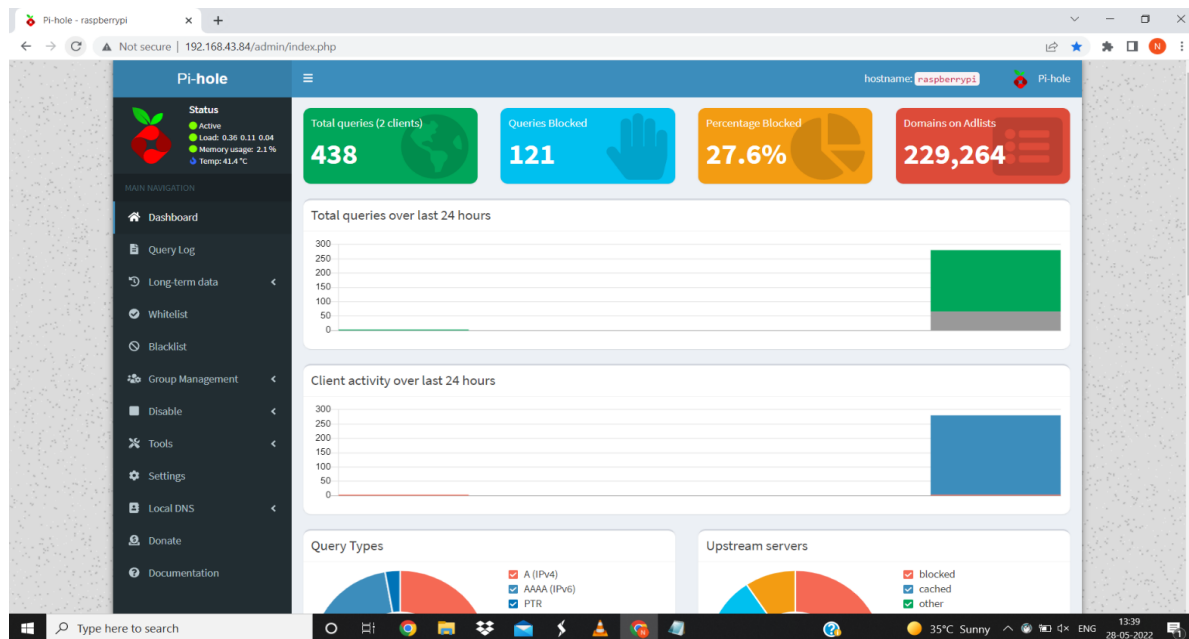
- Raspberry pi
- SD card
- Power supply 5V ,2.5 amps
- USB cable

Software components

- Ethernet connection
- Putty for headless setup
- Raspbian OS
- Pi hole networking tool

CHAPTER 5: PROJECT IMPLEMENTATION :-

Considering that many content sites, including ours, rely on advertising for a significant portion of their revenue, it makes sense to whitelist those you wish to support so they can serve you ads. Pi-hole has a whitelist menu where we can add specific domains and subdomains which will be added to Pi-hole's lists.



Pi-hole - raspberrypi x (170) Sarsenapati Hambirao | Pi x www.facebook.com x +

Not secure | 192.168.43.84/admin/queries.php

Pi-hole

Status
 ● Active
 ● Load: 0.06 0.08
 ● Memory usage: 3.0 %
 ● Temp: 44.8 °C

MAIN NAVIGATION

- Dashboard
- Query Log
- Long-term data
- Whitelist
- Blacklist
- Group Management
- Disable
- Tools
- Settings
- Local DNS
- Donate
- Documentation

hostname: raspberrypi

Recent Queries (showing up to 100 queries), show all

Search: Type / Domain / Client

Show 10 entries

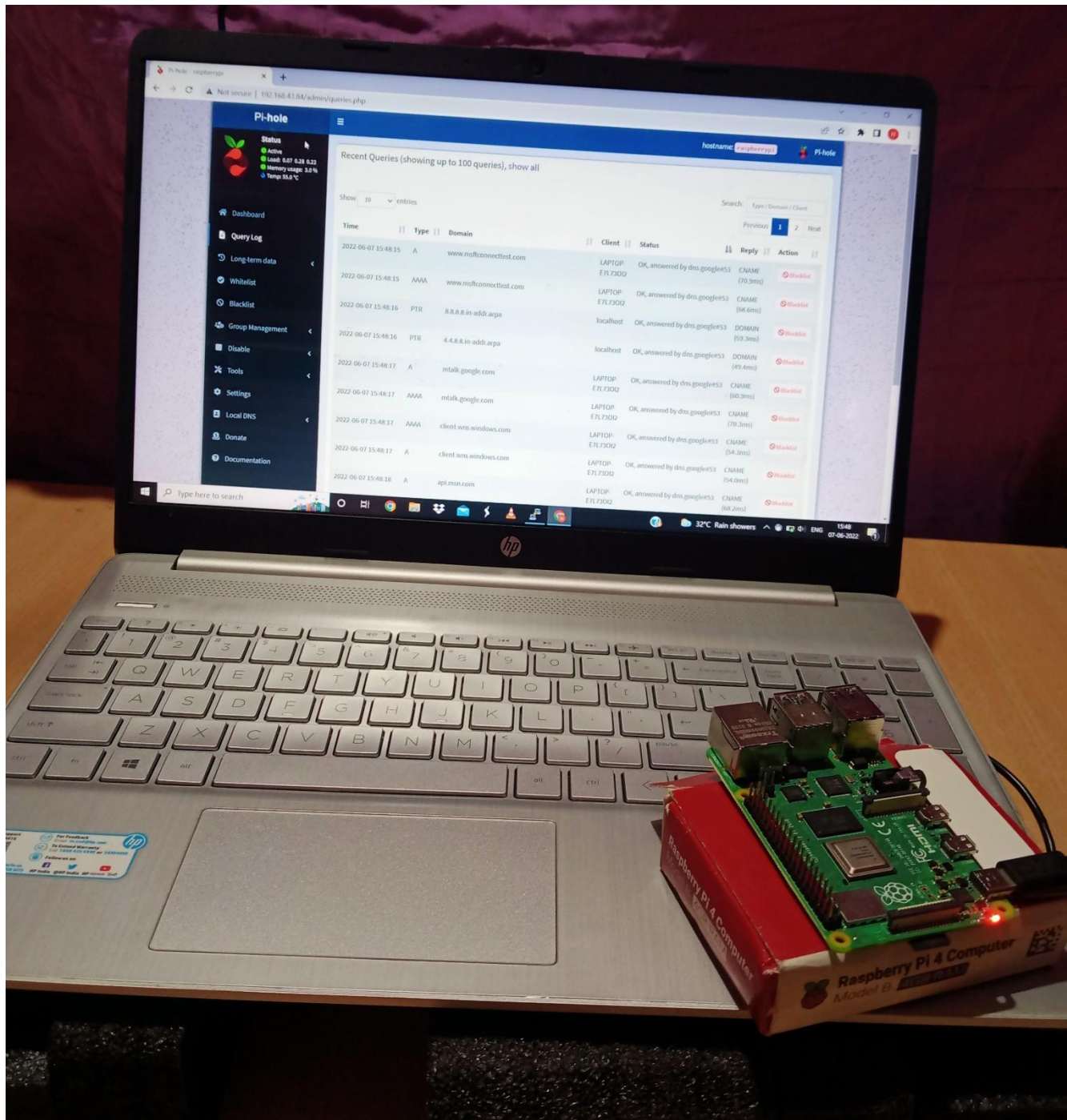
Previous 1 2 3 4 5 ... 10 Next

Time	Type	Domain	Client	Status	Reply	Action
2022-05-28 13:27:01	AAAA	googleads.g.doubleclick.net	LAPTOP-E7L73OI2	Blocked (gravity)	IP (0.1ms)	Whitelist
2022-05-28 13:27:01	A	googleads.g.doubleclick.net	LAPTOP-E7L73OI2	Blocked (gravity)	IP (0.1ms)	Whitelist
2022-05-28 13:26:37	AAAA	securepubads.g.doubleclick.net	LAPTOP-E7L73OI2	Blocked (gravity)	IP (0.0ms)	Whitelist
2022-05-28 13:26:37	A	securepubads.g.doubleclick.net	LAPTOP-E7L73OI2	Blocked (gravity)	IP (0.1ms)	Whitelist
2022-05-28 13:26:26	AAAA	googleads.g.doubleclick.net	LAPTOP-E7L73OI2	Blocked (gravity)	IP (0.0ms)	Whitelist
2022-05-28 13:26:26	A	googleads.g.doubleclick.net	LAPTOP-E7L73OI2	Blocked (gravity)	IP (0.0ms)	Whitelist
2022-05-28 13:26:21	AAAA	googleads.g.doubleclick.net	LAPTOP-E7L73OI2	Blocked (gravity)	IP (0.1ms)	Whitelist
2022-05-28 13:26:21	A	googleads.g.doubleclick.net	LAPTOP-E7L73OI2	Blocked (gravity)	IP (0.0ms)	Whitelist
2022-05-28 13:26:11	AAAA	securepubads.g.doubleclick.net	LAPTOP-E7L73OI2	Blocked (gravity)	IP (0.3ms)	Whitelist

Type here to search

35°C Sunny 13:28 28-05-2022

CHAPTER 6: RESULTS AND DISCUSSIONS :-



The Pi-hole, which is going to be the black hole for all the advertisements. It is provided with all the software's required to filter all the IP address provided to the black list page of the user interface provided for Pi-hole and also the advertisements showing domains. The major benefit about the Pi-Hole is that, it provides the user with a user interface that provides necessary statistics about the advertisements being blocked. It also provides the user with the performance about the devices that are connected to the router. International Journal of Pure and Applied Mathematics Special Issue 1773 It gives a detailed information about the DNS queries, domains that are being blocked for till the time it is closed. By providing the user with a flexible user interface, the user is benefited in many ways with how the user will able to blacklist or whitelist the websites to the user's requirements. The Pi-Hole interface is also provided with an option to blacklist or whitelist a domain provided by the user. By blacklisting a domain, the user will not be able to view any of the advertisements that are by the websites. Which in turn provides the user with a reliable and optimistic browsing experience. In addition, the other option is that the user can also whitelist the domains that being viewed by the user. By whitelisting the domains, it is nothing more complicated than just by allowing the websites (domains) to show the advertisements that are being published by the websites (domains). Most commonly, the websites that are being whitelisted are YouTube because those are websites were the people are benefitted with a pay after the uploaded video reaches a certain point of views. In the user interface, the user will be asked to provide a user name and a password with which the Pi-hole will be logged in. Better security is provided for the Pi-hole in which the user's privacy is secured. Where as in normal traditional ad blocker it doesn't provide any user interface with which the user and interact with. And no statistics about the ads being blocked is provided. Pi-hole user interface provide the user with absolute information about the domains that are been filtered. Thus, we have performed Ad-Blocking.

CHAPTER 7: ADVANTAGES, DISADVANTAGES AND APPLICATION

7.1: Advantages:

- Remove distracting ads, making pages easier to read
- Make web pages load faster
- Keep advertisers away from tracking you across websites
- Reduce bandwidth (especially important with mobile devices)
- Reduce battery usage (again, important for mobile devices)
- Protect you from malware

7.2: Disadvantages:

- It can only block resources at the domain level, so it's unable to block any first-party ads or to apply any cosmetic filters.
- It's also a bit more difficult to temporarily disable or to allow a specific blocked domain if you find that it has broken a website that you want to view.

7.3: Application:

- Devices such as Smart TVs which don't use a browser but still feature ads, these can also be blocked using Pi Black-Hole.
- Viewing YouTube videos on mobile phones, PlayStation and Xbox gaming consoles, all ads will be blocked.

CHAPTER 8: CONCLUSION AND FUTURE SCOPE

8.1: Conclusion:

A framework that uses electronic gadgets with less power utilization to filter ads Apart from the traditional Ad Blockers, which might cause problems in situations because it is developed by a third-party developer. This project goes on with a network-based Ad Blocker, where ads are filtered which appear in the websites. It is better to use an ad-blocker created by us instead of third-party ad blocker.

Now-a-days browser-based ad blockers which are added as extension where it is unable to block ads on smart devices. Also, it will add some harmful software which in turn downloads some viruses which causes the user to face issues in the device.

Thus, our project blocks ads on any type of software. So, it is better to go on with an ad blocker created within the network.

8.2: Future Scope:

Our Project's main priority is to Block Ads. But in future we can modify our project and can achieve many functionalities such as:

- Blocking Specific Websites
- Adding Parental controls for kids by blocking websites
- Blocking monetary Ads
- Blocking Trackers
- Blocking Social media websites like facebook, Instagram in schools/colleges

CHAPTER 9: BUDGET DETAILS OF THE PROJECT

Budget details of the project

Sr No.	Components used	Specification	Quantity	Cost
1	Raspberry Pi	Model 4B	1	4500 Rs /-
2	SD Card	Upto 16GB	1	610 Rs /-
			Total =	5110 Rs /-

BIBLIOGRAPHY

- <https://linustechtips.com/topic/1094810-pi-hole-setup-tutorial/>
- https://www.youtube.com/watch?v=KBXTnrD_Zs4
- <https://www.raspberrypi.com/news/pi-hole-raspberry-pi/>
- <https://www.tomshardware.com/how-to/set-up-pi-hole-raspberry-pi>

APPENDIX

- “Thorin Klosowski”, 8/3/15, <https://lifehacker.com>
- ”Thomas weinbrenner”, October 11 2015, <https://www.raspberrypi.org/>
- “Steve Feldman”, October 26 2016, <http://stackoverflow.com>
- <http://www.wikipedia.com>
- <http://www.raspberrypi.org/downloads/>
- <https://www.opensource.com/>
- “RobVinson”,30/10/2016,<https://www.udacity.com/course/raspberryTutorialpoint>
- http://www.raspberrypiwiki.com/index.php/Raspi_UPS_HAT_Board
- “M.Parsan,23/09/2015”,<http://www.instructables.com/id/Raspberry-Pi-Projects/>
- http://in.zapmetasearch.com/ws?q=raspberry%20pi%20accessories&de=c&asid=zm_in_ba_2_cg1_08
- Rezni.S, M.Revathi, “Multi-Keyword Web Crawling Using Ontology”, International Journal of Innovations in Scientific and Engineering Research (IJISER), Vol.1, No.4, pp.320-324, 2014.
- “Meet the Raspberry Pi” Eben Upton , McGraw Hall Publications, Third Edition , 2015
- “Raspberry Pi: Measure, Record, Explore” Malcom Maclean , Penguin Publications , Second Edition , 2014