



SAN JOSÉ STATE UNIVERSITY

CMPE 272
Enterprise Software Platforms

PROJECT REPORT

NWSENSE

Team 13

Team Members:

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Github Repo : <https://github.com/SJSU272Lab/Fall16-Team13>

Objective:

NWSense is a web app based internet security system for home networks which provides security over the whole network. It provides allows the user to monitor the network and block IP addresses or websites which are to be accessed on the network. It also allows the user to view a detailed analysis. The web app requires the user to login with the username and password. The system then fetches the IP address/MAC address of the router. This provides the user with the configuration of the system, and the feature to edit the configuration. After the configuration has been saved, the blocked IP addresses will not be able to access the network, and the users will not be able to surf the blocked websites. The user can also see and monitor what all devices are connected to the network. The user can also see a detailed analysis of what is happening inside the network, e.g., what websites are most visited, what users make the most use of network, etc.

Target Audience:

For the product to work, it is required that NWSense's customers use our piece of preinstalled and pre-configured hardware as an internet access point and registered it with an NWSense account.

Persona 1:

Home Network Owner

Persona 2:

Home Network User

Proposed Solution:

We can access our router from the external network using DDNS and port forwarding. An exception is that these capabilities are not available on all routers. For solving this problem, internally **NWSense** will be using a dedicated IOT device for running the nmap and other utilities within the home network for capturing data packets, port scanning and will be pushing this data to the server. On the server analysis will be done over this data using technologies like Spark. The user can select IP's , websites to block on the website. This information will be pushed to the Raspberry-Pi from the server. The Raspberry-Pi will provide a wifi end point to which other devices in the home network will connect to. So the IOT device acts as layer over the Router. The proxy server/gateway present on the Raspberry Pi will filter each request it gets from the connected device and then forward it to the router.

Implementation:

Technology Stack:

The application has been developed in python, flask, html, css, java-script, node-red, nmap, using raspberry Pi model 3B as the hardware, Bluemix Cloudant and IoT Platform for communication and Twilio service for real time notification. We also use Amazon EC2 service as well as docker to deploy a custom server.

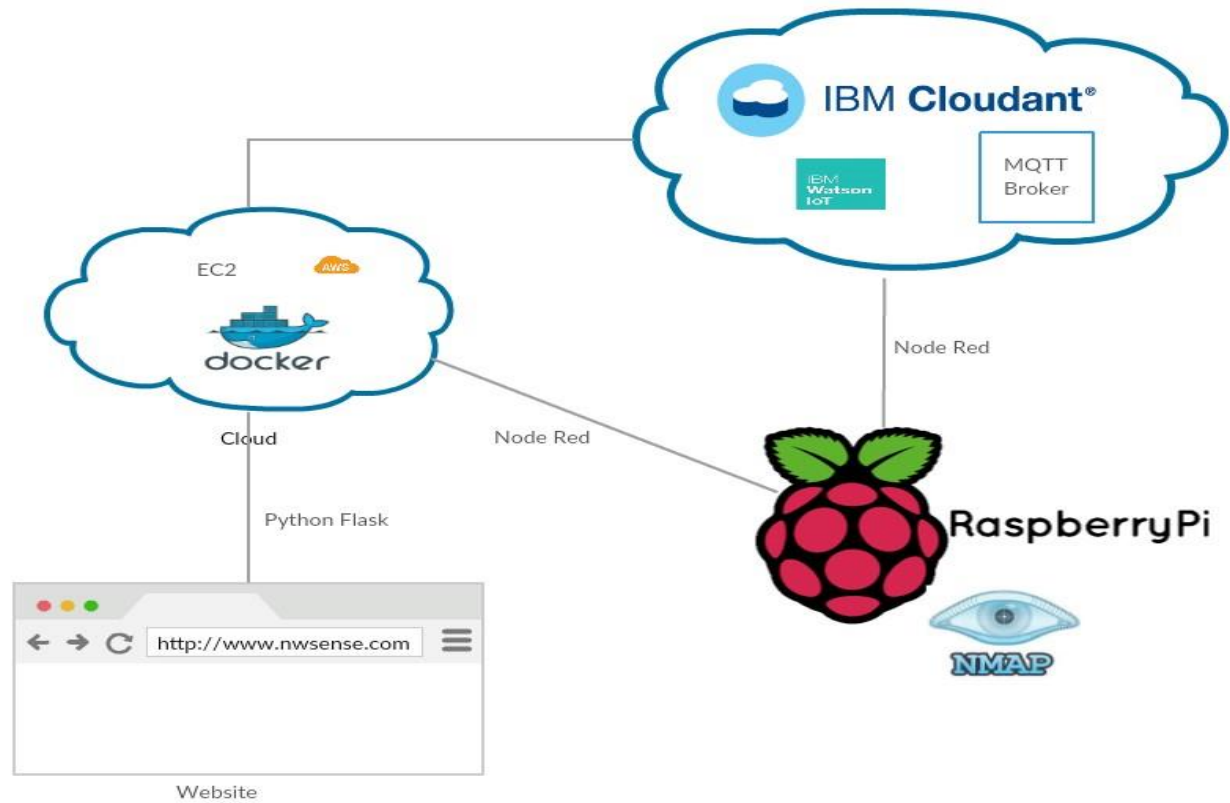
Technologies Used:

1. Raspberry Pi - As a proxy server
2. NMAP - For network scanning
3. Node-Red – Communication with RPi
4. Cloudant – Store DB
5. Python, Flask, HTML, CSS, Bootstrap – Dynamic Website Development
6. Apache Spark – For Analysis
7. Twilio – For live notifications
8. Watson IoT Platform
9. Docker – Container
10. AWS – For website deployment

Design:

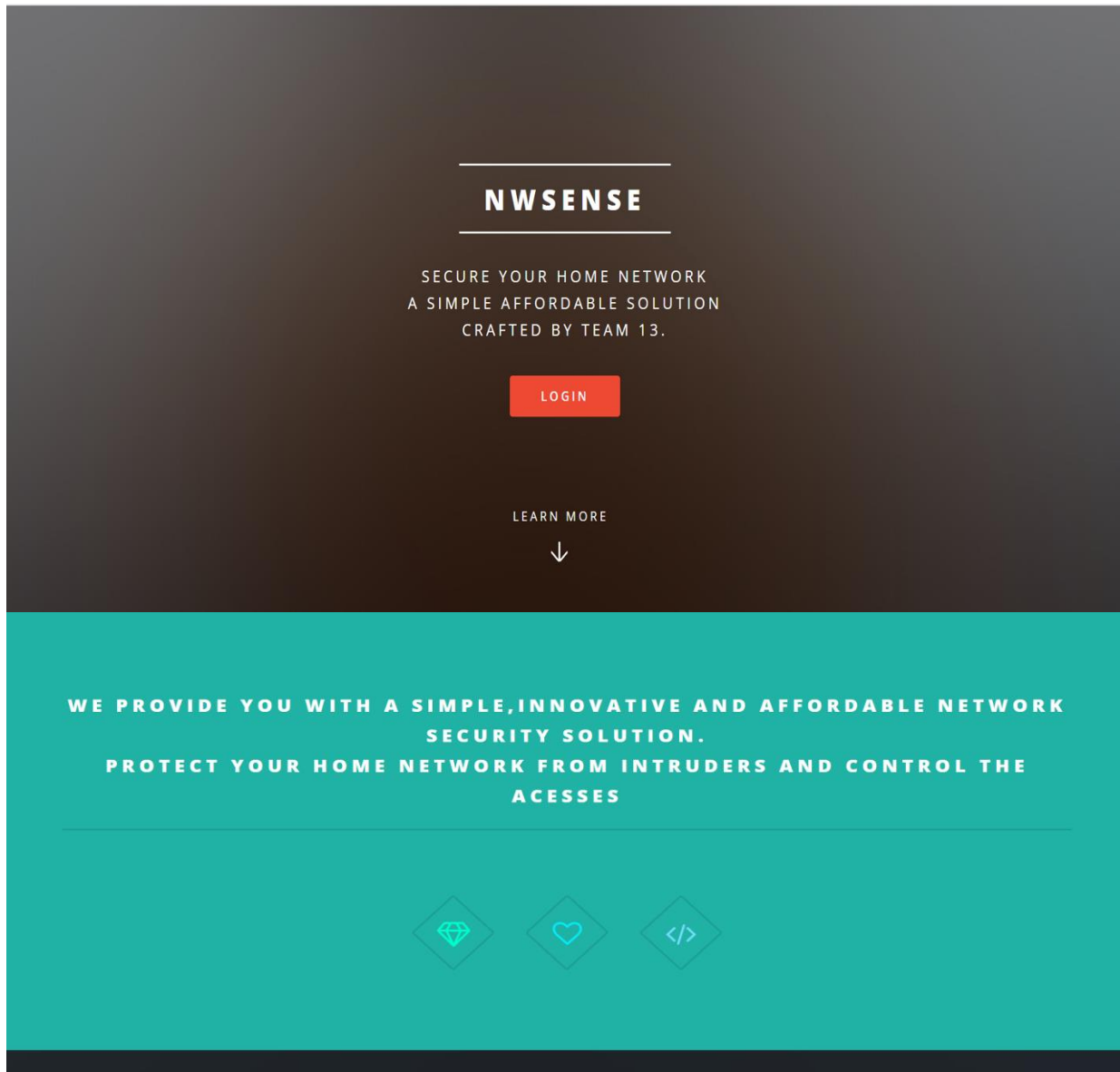
Raspberry Pi model 3B as access point. All devices need to use wireless signal from this device so that all route will be managed by preinstalled Squid and Squid-guard. Raspberry Pi will push new data to Bluemix IoT platform using Node Red with an interval of 30 seconds. Data then will be stored in Cloudant database for future analysis. In the meantime, another stream of data including strange MAC addresses using the home network will be pushed to a custom server for real time notification. Custom Server: a customer server will be deployed on AWS EC2 using Docker. The server is a bridge between NWSense webserver and another Cloudant service - User database. It also accepts data from raspberry Pi and use Twilio for real time notification when there is a new device with new MAC address accessing the home network.

Architecture Diagram:



Flow of Application using Screenshots

Welcome Page of the Application:



Welcome page when you open the URL: <http://ec2-54-165-49-28.compute-1.amazonaws.com/index> . It gives a brief description of our service.

Login Page to give access to the user in his home network.

NWSENSE

LOGIN TO GAIN ACCESS TO YOUR HOME NETWORK

User Id






Enter id

Password

Password

LOGIN

[Not a Member? Contact us](#)

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When you click to the login button on the welcome page you are redirected to the login page where you enter your unique id and password for authentication. As it is a product based website we don't have a signup process. For getting your id you need to contact us by clicking on contact hyperlink.

Contact Page : for subscription info

NWSENSE

NWSENSE

WANNA JOIN OUR SECURE COMMUNITY?

BUY OUR SOLUTION

We bring you the best in industry **network security** solution for your home network. A little device will give you the power to control your home network from anywhere in the world.

LOOK FOR THE BEST PLAN

Plan Type	Description	Price
Premium	With 24 months subscription and dedicated device	129.99\$
Standard	With 15 months subscription and dedicated device	99.99\$
Basic	With 12 months subscription and dedicated device	50.99\$

GIVE US A CALL IF INTERESTED OR NEED ASSISTANCE

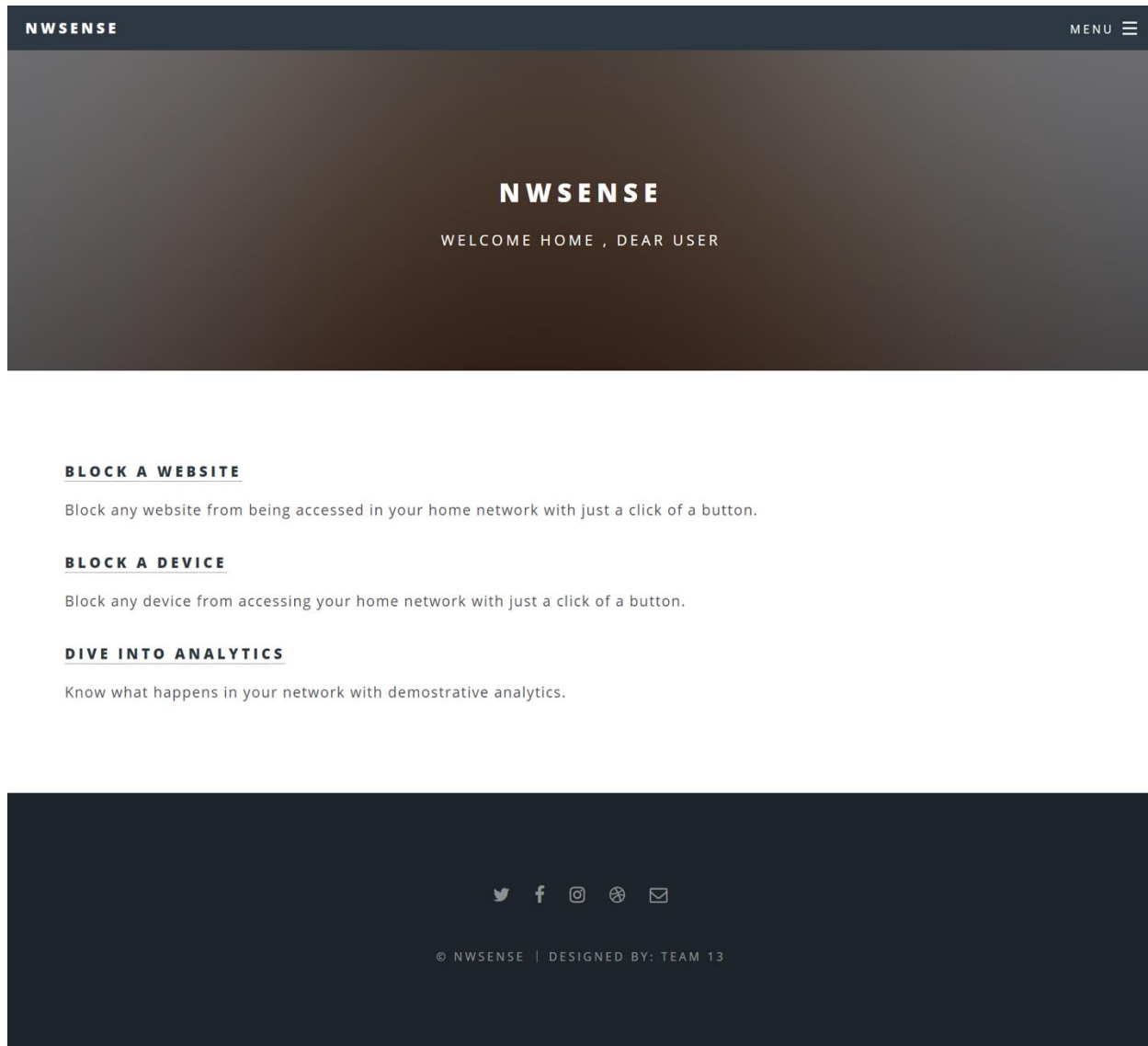
PH:656-276-7854

EMAIL US: CONTACT@NWENSE.COM

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This page lets you see our subscription plans and contact information.

Home page of the application:



After logging in you are redirected to the Home page of the application which contains all the information about the services NwSense provides. User can navigate through the site using the menu bar.

Block a website in your home network using NwSense:

NWSENSEMENU

BLOCK A WEBSITE!
CONTROL WHAT IS BEING ACCESSED IN YOUR HOME NETWORK

WEBSITES BLOCKED ON YOUR NETWORK

BLOCK WEBSITES

☐ facebook

☐ twitter

☐ bigdaddy






☐ msn

☐ youtube

Enter a website url eg: reddit.com

BLOCK

RESET

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You can select the website to block and you can even enter the url of the website in the text box and click on block.

Register a device in your home network:

NWSENSE

MENU

REGISTER A DEVICE!

LET YOUR PERSONAL DEVICES FEEL AT HOME

REGISTER A DEVICE

Mac Address

Enter MacAddress , for eg: 87:f3:65:76:dd

REGISTER

[Dont know your device MacAddress? Let us help you.](#)

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This page allows you to enter the mac address of the devices you use at home so that they can be recognized. To keep it user friendly, this page also contains a link to a tutorial explaining how user can get the mac address of his device.

Block a device:

NWSENSE

MENU

BLOCK A DEVICE!

CONTROL WHO IS ALLOWED TO ACCESS YOUR HOME NETWORK

DEVICES ALREADY BLOCKED ON YOUR NETWORK

- 34:68:95:ED:9D:2D
- 64:9A:BE:91:9E:32
- 60:F4:45:77:04:4D
- 98:5F:D3:CD:9B:3F

SELECT A DEVICE TO BLOCK

☐

78:4B:87:D1:E1:81

☐

90:B9:31:C6:9F:28

☐

D0:E7:82:F6:13:3B

☐

B8:53:AC:C9:CF:25

☐

AC:D1:B8:BF:B2:67

☐

QD:L5:KS:8R:H8:RF

☐

TD:L5:KS:8R:V0:RF

☐

30:75:12:81:00:99

☐

34:68:95:ED:9D:2D

☐

88:71:E5:9B:3A:D3

☐

C0:EE:FB:3B:D3:89

☐

80:E6:50:18:5C:F4

☐

QD:L5:KS:8R:V0:RF

☐

B2:B2:A4:7E:BB:EA

BLOCK

RESET

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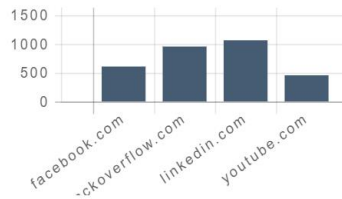
NwSense application gives you the power to block a device to access your home network. All the devices which access your home network is shown to the user and user is allowed to block any of these devices to access the network if he finds it suspicious.

Dashboard – Power of Analytics:

NWSENSE

MENU

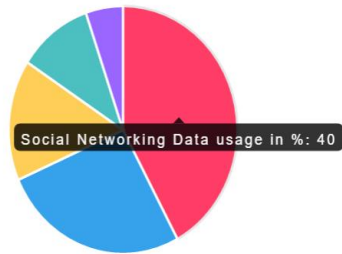
TOP APPLICATIONS



TOP DEVICES

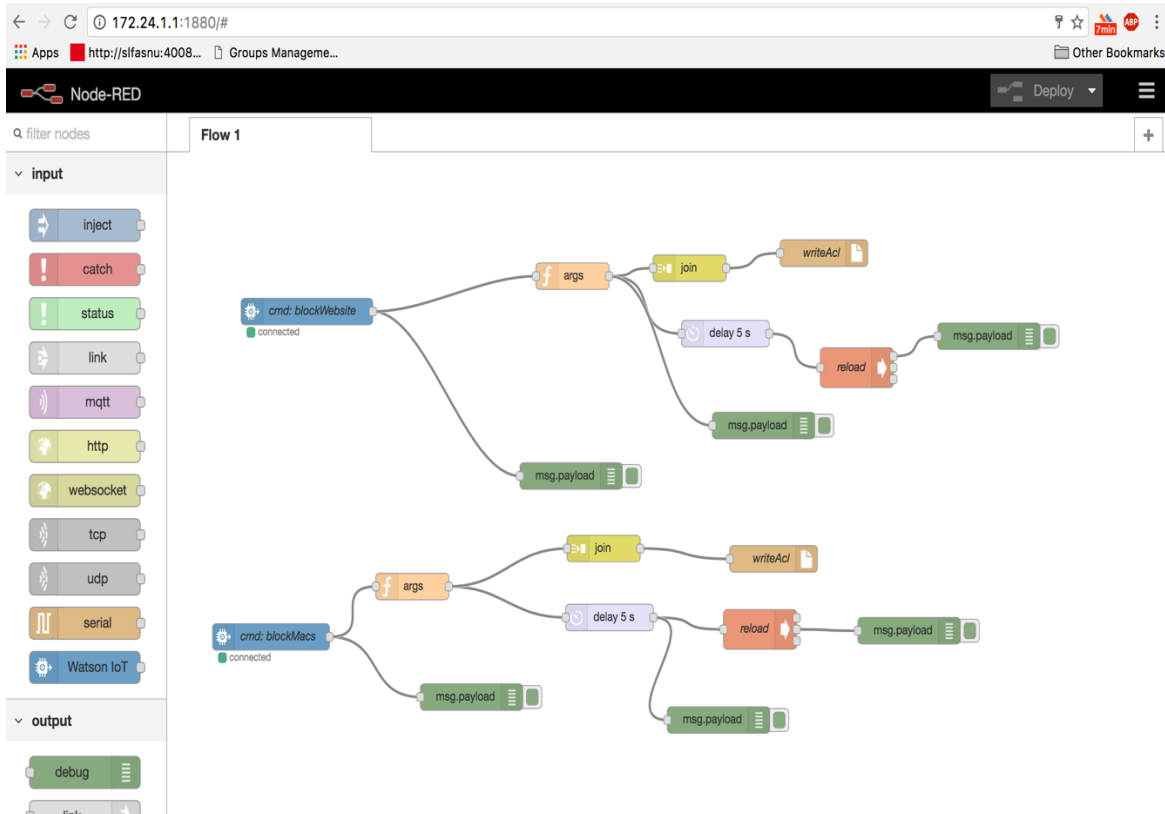


DATA USAGE BY CATEGORY



This page allows user to see his personalized dashboard. It contains analytics of the home network usage. These analytics is represented as graphs and charts which is easy for user to understand.

Node red circuit running on Raspberry Pi For blocking of website and mac address



References:

1. <http://www.danscourses.com/Linux-Fundamentals/turn-a-raspberry-pi-into-a-web-filter-proxy-with-squidguard.html>
2. <http://noderedguide.com/>
3. <https://www.twilio.com/docs/api/rest/sending-messages>
4. <http://flask.pocoo.org/>
5. <http://www.squidguard.org/>