

Configuration Manual

MSc Internship
Cybersecurity

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MSc Project Submission Sheet
School of Computing



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Project Title: Behavioural Based Threat Modelling to Increase The Efficiency in Breach Identification and Notification

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Configuration Manual

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1 Introduction

This manual explains how the system and software are set up to produce the results of thesis “Behavioural based threat modelling to increase the efficiency in breach identification and notification” in relation to software and hardware requirements.

2 System Specifications:

Hardware Requirements:

Processor: 1.6 GHz Intel. Core i5
Memory: 8 GB 2133 MHz LPDDR3
Hard disk size: 121.02 GB

Software Used:

Operating System: macOS 10.14.6

Tools & Applications:

Visual Studio Code 1.40.2 : Code editor that is used to develop and debug modern web applications.

Xampp : Cross-platform web server used for testing and deployment which has apache HTTP Server and MySQL.

Postman: Tool used for testing API in various environments, helps us to simulate the user interaction with the system.

Angular CLI: Command line tool used to generate and modify applications

3 Execution

The steps followed for installing and execution are as follows

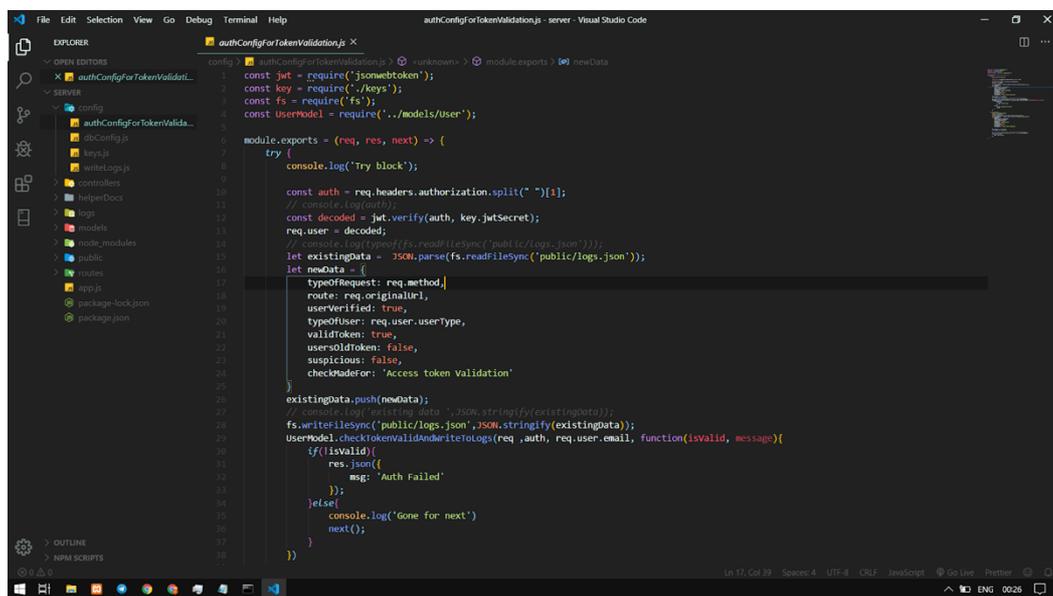
Step 1: Install Visual Studio Code in the system.

Step 2: Install Xampp to access MySQL database.

Step 3: Install the postman tool to generate API request

Step 4: Install Nodejs and Angular CLI.

Step 5: Check and validate token that has been passed as token



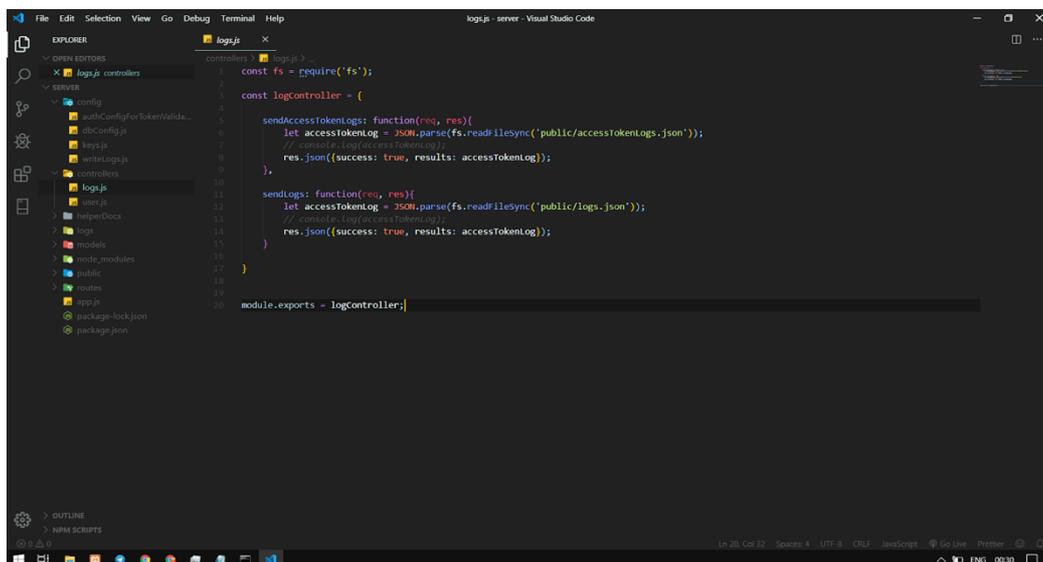
```
const jwt = require("jsonwebtoken");
const key = require("./keys");
const fs = require("fs");
const userModel = require("../models/User");

module.exports = (req, res, next) => {
  try {
    console.log("try block");

    const auth = req.headers.authorization.split(" ")[1];
    // console.log(auth);
    const decoded = jwt.verify(auth, key.jwtSecret);
    req.user = decoded;
    // console.log(decoded);
    let existingData = JSON.parse(fs.readFileSync("public/logs.json"));
    let newData = {
      typeOfRequest: req.method,
      route: req.originalUrl,
      userVerified: true,
      typeOfUser: req.user.userType,
      validToken: true,
      usersOldToken: false,
      suspicious: false,
      checkMadeFor: 'Access token Validation'
    };
    existingData.push(newData);
    // console.log('existing data', JSON.stringify(existingData));
    fs.writeFileSync("public/logs.json", JSON.stringify(existingData));
    userModel.checkTokenValidAndWriteToLogs(req, auth, req.user.email, function(isValid, message){
      if(!isValid){
        res.json({
          msg: 'Auth Failed'
        });
      }else{
        console.log("Gone for next")
        next();
      }
    })
  }
}
```

Figure – 1 Validating Tokens

Step 6: Controllers/logs.js is used to handle requests and response from postman application



```
const fs = require("fs");

const logController = {
  sendAccessTokenLogs: function(req, res){
    let accessTokenLog = JSON.parse(fs.readFileSync("public/accessTokenLogs.json"));
    // console.log(accessTokenLog);
    res.json({success: true, results: accessTokenLog});
  },
  sendLogs: function(req, res){
    let accessTokenLog = JSON.parse(fs.readFileSync("public/logs.json"));
    // console.log(accessTokenLog);
    res.json({success: true, results: accessTokenLog});
  }
}

module.exports = logController;
```

Figure –2 Handling API Requests

Step 7: Checking the login attempts to identify Brute Force.

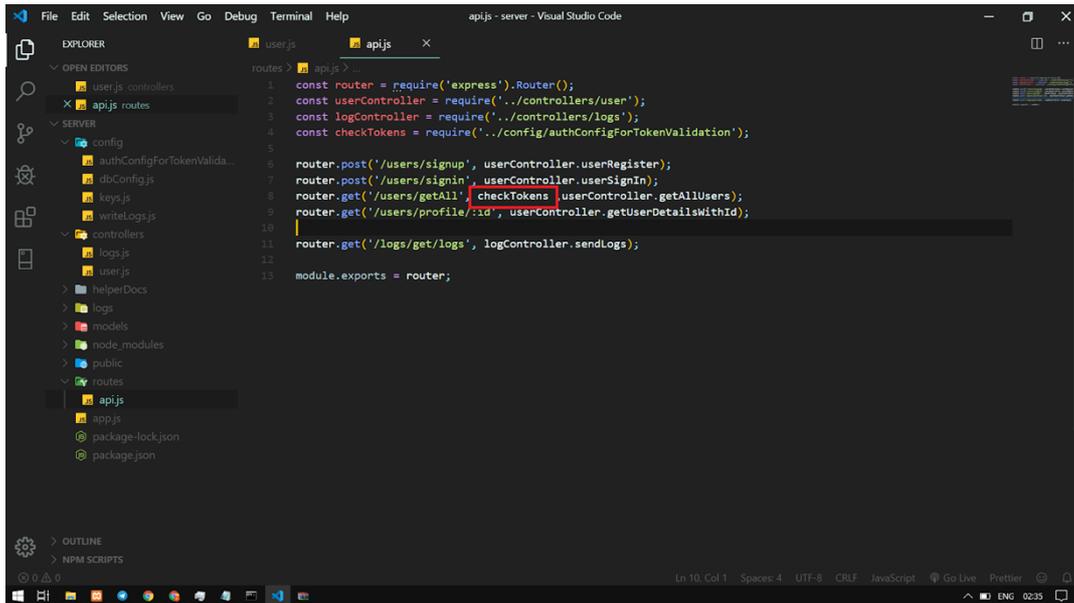
```
userSignIn: function (req, res) {
  userModel.isloginAllowed(req.body.email, function(isAllowed, message){
    if(!isAllowed){
      let isAllowedData = {
        email: req.body.email,
        typeOfRequest: req.method,
        route: req.originalUrl,
        userVerified: true,
        typeOfUser: 'ind',
        validToken: true,
        usersOldToken: false,
        suspicious: false,
        checkAdferor: 'Brute force attack'
      };
      writeLogs(isAllowedData);
      userModel.getUserWithEmail(req.body.email, function (userErr, userRow) {
        if (userErr) { ... }
        } else if (userRow) { ... }
        } else { ... }
        userModel.comparePasswords(userRow.password, req.body.password, function (compareErr, compareResult) {
          if (compareErr) { ... }
          } else if (compareResult) {
            userModel.setNoOfAttemptsToZero(req.body.email, function (err, rows) {
              if (!err) { ... }
              } else { ... }
            });
          }
        } else { ... }
      });
    }
  });
}
```

Figure –3 Brute Force Identification

password	current_token	no_of_attempts
mail.com \$2a\$10\$ha/xon4B3Z2j8je3b0iTu26rzLmERAKikJNmGzGVz...	NULL	0
com \$2a\$10\$NKBVOTUlm2eYSWryydGx8OGwR4N/BDSvF1vRmRGIQFI...	eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJlbWVpbGl6Ijoi...	0

Figure –4 Login attempts validation

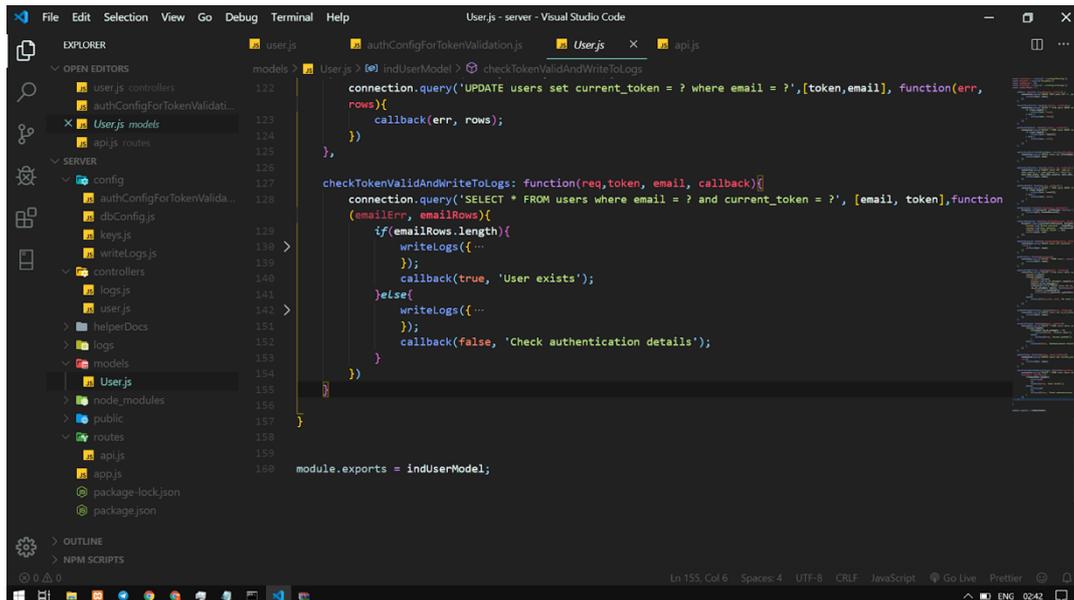
Step 8: Check tokens to identify Access Token Manipulation Technique.



```
1 const router = require('express').Router();
2 const userController = require('../controllers/user');
3 const logController = require('../controllers/logs');
4 const checkTokens = require('../config/authConfigForTokenValidation');
5
6 router.post('/users/signup', userController.userRegister);
7 router.post('/users/signin', userController.userSignIn);
8 router.get('/users/getAll', checkTokens, userController.getAllUsers);
9 router.get('/users/profile/:id', userController.getUserDetailsWithId);
10
11 router.get('/logs/get/logs', logController.sendLogs);
12
13 module.exports = router;
```

Figure – 5 API routes Middleware

Step 9: Validate new token and old token to check whether the sent token is valid or not.

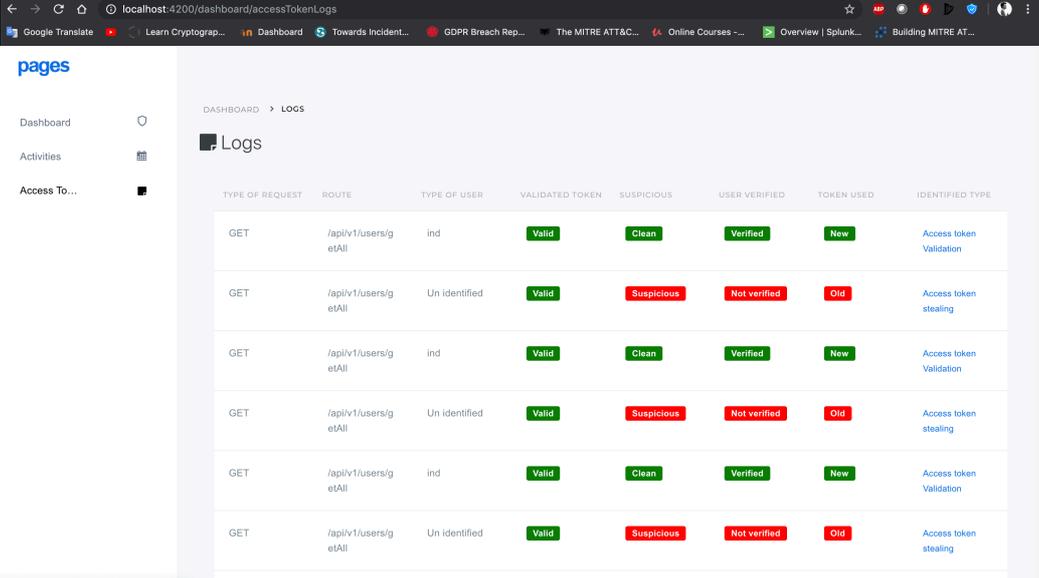


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Figure – 6 Steal Access Token Technique Identification

Output:

The Dashboard developed using pages template will show the suspicious activities from the API requests generated from Postman.



TYPE OF REQUEST	ROUTE	TYPE OF USER	VALIDATED TOKEN	SUSPICIOUS	USER VERIFIED	TOKEN USED	IDENTIFIED TYPE
GET	/api/v1/users/getAll	ind	Valid	Clean	Verified	New	Access token Validation
GET	/api/v1/users/getAll	Un identified	Valid	Suspicious	Not verified	Old	Access token stealing
GET	/api/v1/users/getAll	ind	Valid	Clean	Verified	New	Access token Validation
GET	/api/v1/users/getAll	Un identified	Valid	Suspicious	Not verified	Old	Access token stealing
GET	/api/v1/users/getAll	ind	Valid	Clean	Verified	New	Access token Validation
GET	/api/v1/users/getAll	Un identified	Valid	Suspicious	Not verified	Old	Access token stealing

Figure – 7 Dashboard displaying alerts for above techniques