

# Unit 4 - Software Security

Content Area: **Mathematics**  
Course(s):  
Time Period: **Marking Period 2**  
Length: **4-5 weeks**  
Status: **Published**

## Brief Summary of Unit

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Students begin by examining various web applications through the use of development tools in a web browser. The unit continues on to several lessons about SQL. Students learn that SQL is a programming language commonly used in database interactions, and that apps using SQL can be vulnerable to attack, depending on how the SQL code is implemented. Finally, cross-site scripting is examined.

Revised November 2023

## Standards

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- TECH.8.1.12.A.CS1
- TECH.8.1.12.A.CS2
- TECH.8.1.12.D.2
- TECH.8.1.12.D.CS1
- TECH.8.1.12.D.CS2
- TECH.8.1.12.E.4
- TECH.8.1.12.E.CS3

CS.9-12.AP Algorithms & Programming

CS.9-12.CS Computing Systems

CS.9-12.DA Data & Analysis

CS.9-12.ED Engineering Design

CS.9-12.IC Impacts of Computing

CS.9-12.NI Networks and the Internet

LA.K-12.NJSLSA.L4 Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.

LA.K-12.NJSLSA.L5 Demonstrate understanding of word relationships and nuances in word meanings.

## Transfer

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- Early in the unit, students learn how to use an Internet browser for more than just passive browsing.

Browser can serve as a useful tool for developing and debugging code. Students will be able to take what they learn in this unit about browser development tools and various kinds of cyber attacks and employ that knowledge if they go on to write any of their own computer code.

## Essential Questions

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- How are browser development tools useful with helping to mitigate the kinds of cyber attacks you have learned about in this unit?
- How do web browsers enable people to develop and debug computer code?
- How is SQL both beneficial and harmful when used for augmenting web applications?

## Essential Understandings

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- SQL augments website functionality by facilitating interactions between the user and a database. Depending on how this is coded, hackers could potentially learn about the content of the database.
- Web browsers have features that enable one to examine the code of a web application loaded in a browser. Changes can be made on the client-side to observe the effects those changes have, without actually altering the live application. This helps one to write and debug computer code, as well as to help mitigate threats from cyber attacks.

## Students Will Know

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- How to build more specific SQL queries
- SQL is used to allow users to interact with databases that store a variety of information
- The components of an Internet browser that allow for web application development
- The cyclical relationship between clients, servers, and databases
- What cross-site scripting is
- What SQL injection is

## Students Will Be Skilled At

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- How hackers use cross-site scripting to take control of all/part of a user's computer
- How hackers use SQL injection to gain information from databases
- How to examine website application code using an Internet browser
- How to use SQL to query a database
- Incorporating their knowledge of the cyclical client-server-database relationship while thinking of ways to mitigate a variety of cyber attacks

## Evidence/Performance Tasks

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Assessments

- **Formative:** Daily assessments using examples from class notes and CodeHS.com, AP Classroom/Albert Checks for Understanding
- **Summative:** Teacher-created assessments/projects and CodeHS Computer Science Projects, AP Classroom/Albert Unit Assessments
- **Benchmark:** Check for understanding benchmark assessments on CodeHS, AP Classroom/Albert/Khan Academy Diagnostics
- **Alternative Assessments:** Student-centered activities such as a doorbell coding project, game design projects, and other activities involving real world applications

- Answer essential questions
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Provide alternative means of assessments for certain students
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Written assignments that assess the essential questions that involves providing explanations

## **Learning Plan**

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- Clients, Servers, and databases
- Cross-Site Scripting
- Data Exposer
- Hacking Counteraction Activity
- Internet browser developer tools
- Introduction to SQL
- Introduction to Web Applications
- Possible Guest Speakers on Cyber Attacks
- Queries in SQL
- SQL Injection

## **Materials**

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Core instructional materials: [Core Book List](#)

Supplemental materials: CodeHS

- Computers
- Teacher created activities
- Teacher created notes
- Website such as codehs.com for content
- Websites to research current events

## **Suggested Strategies for Modifications**

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[Possible accommodations/modification for Introduction to Cybersecurity](#)