Virginia Computer Science

Foundations (9-12)

Adopted 2017

Computing Systems

1. **The student will** CSF.1
   a. compare the structures, functions, and interactions between application software, system software, and hardware; and CSF.1.A
   b. explore the relationship between hardware and software using the Internet of Things. CSF.1.B

Networks and the Internet

2. **The student will model how information is broken down into smaller pieces, transmitted as packets through multiple devices over networks and the Internet, and reassembled at the destination.** CSF.2
3. **The student will explain the role of protocols in transmitting data across networks and the Internet.** CSF.3
4. **The student will evaluate the scalability and reliability of networks, by describing the relationship between routers, switches, servers, topology and addressing.** CSF.4

Cybersecurity

5. **The student will identify and explain ways that sensitive data (assets) can be threatened by malware and other computer attacks, using appropriate terminology.** CSF.5
6. **The student will give examples of ways to protect sensitive data (assets) from malware and other computer attacks and evaluate them according to multiple criteria.** CSF.6
7. **The student will explain typical tradeoffs between usability and security and recommend security measures in a given scenario based on these (or other) tradeoffs.** CSF.7
8. **The student will write or adapt a program to validate its input and to avoid certain kinds of vulnerabilities.** CSF.8

Data and Analysis

9. **The student will evaluate the tradeoffs in how data elements are organized and where data is stored.** CSF.9
10. **The student will create interactive data visualizations using software tools to help others better understand real-world phenomena.** CSF.10

11. **The student will use data analysis tools and techniques to identify patterns in data representing complex systems.** CSF.11

Algorithms and Programming

12. **The student will develop a program working individually and in teams using a text-based language.** CSF.12
13. **The student will identify the expected output of a program given a problem and some input.** CSF.13
14. **The student will design and iteratively develop programs for practical intent or personal expression, incorporating feedback from users.** CSF.14
15. **The student will design and implement algorithms using** CSF.15
    a. sequencing of instructions; CSF.15.A
    b. conditional execution; and CSF.15.B
    c. iteration. CSF.15.C
16. **The student will implement a program that accepts input values, stores them in appropriately named variables, and produces output.** CSF.16
17. **The student will trace the execution of an algorithm, illustrating output and changes in values of named variables.** CSF.17
18. **The student will apply the basic operations used with numeric and non-numeric data types in developing programs.** CSF.18
19. **The student will use predefined functions to simplify the solution of a complex problem.** CSF.19
20. **The student will apply simple algorithms to a collection of data.** CSF.20
21. **The student will create programs** CSF.21
    a. demonstrating an understanding that program development is an ongoing process that requires adjusting and debugging along the way; and CSF.21.A
    b. using version control to create and refine programs. CSF.21.B

Impacts of Computing

22. **The student will use tools and methods for collaboration on a project to increase connectivity of people in different cultures and career fields.** CSF.22
23. **The student will evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices.** CSF.23
24. **The student will explain the beneficial and harmful effects that intellectual property laws can have on innovation, including the impact of open source software.** CSF.24

25. **The student will explain the privacy concerns related to the collection and generation of data through automated processes that are not always evident to users.** CSF.25