4 Databases and Programming

Content Area: **Technology**
Course(s): **Computer Systems & Networking I**
Time Period: **March**
Length: **19 class periods**
Status: **Published**

Unit Overview:

This unit introduces:

- databases and gives you practice using a relational database management system.
- database access methods, big data, and careers in working with databases.
- computer programming languages and logic.
- basic programming concepts and careers.

Enduring Understandings:

- A database is an organized collection of data on a computer.
- A relational database stores data on multiple related tables.
- There are three different kinds of data: structured, unstructured, and semi-structured.
- Three kinds of databases include: relational, document, and key value.
- A database management system, or DBMS, is software that allows users to define, manipulate, retrieve, and manage data stored in a database.

Standards/Indicators/Student Learning Objectives (SLOs):

Students will be able to:

- Describe the purposes of a relational database.
- Define basic relational database terminology, including fields, records, primary keys, foreign keys, and one-to-many relationships.
- Describe the basic functions of a non-relational database.
- Describe the purpose of a database management system.
- Use Microsoft Access to explore database objects and create table relationships.

ITEC.9-12.9.4.12.K.(4).10	Develop and maintain a database to store information.
ITEC.9-12.9.4.12.K.30	Employ database applications to manage data.

Career Readiness, Life Literacies, & Key Skills:

TECH.9.4.12.DC.7	Evaluate the influence of digital communities on the nature, content and responsibilities

	of careers, and other aspects of society (e.g., 6.1.12.CivicsPD.16.a).
TECH.9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.
TECH.9.4.12.TL.2	Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
TECH.9.4.12.IML.1	Compare search browsers and recognize features that allow for filtering of information.
TECH.9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Essential Questions:

- What databases do you interact with in your everyday life?
- What are the advantages to storing data in a relational database? Are there disadvantages?
- What is the purpose of a database management system?

Lesson Titles:

3.1 Databases
3.1.1 Introduction to Databases (3:42)
3.1.2 Relational Databases (2:30)
3.1.3 Database Structure (2:55)
3.1.5 Non-relational Databases (2:07)
3.1.7 Database Management Systems (3:18)
3.1.9 Explore an Access Database (1:09)
3.1.11 Tables and Relationships (1:37)

3.2 Interfacing with Databases
3.2.1 SQL (3:13)
3.2.2 Relational Methods (2:49)
3.2.4 Database Access Methods (1:31)
3.2.6 Big Data (4:23)
3.2.8 Careers with Databases (0:13)
3.2.10 Create Queries for a School Database (1:19)

3.3 Introduction to Programming
3.3.1 Introduction to Programming (3:35)
3.3.2 Programming Languages (4:45)
3.3.4 Programming Logic (0:13)
3.3.6 HTML, CSS, and JavaScript (5:44)

3.4 Programming Terms and Concepts
3.4.1 Fundamental Data Types (1:29)
3.4.2 Variables and Arrays (2:57)
3.4.3 Functions (0:13)
3.4.4 Object-Oriented Programming (3:20)
3.4.5 Programming Terminology
3.4.6 Careers in Programming (2:17)

Inter-Disciplinary Connections:

LA.RST.9-10.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.
LA.RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

Equity Considerations:

Climate Change

Databases store the data of the world. Scientists can query data stored from climate change measurements and experiments using programming with the data in a database.

CS.9-12.8.1.12.DA.1	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
TECH.9.4.12.DC.8	Explain how increased network connectivity and computing capabilities of everyday objects allow for innovative technological approaches to climate protection.

Holocaust Mandate

LGBTQ and Disabilities Mandate

Asian American Pacific Islander Mandate

Instructional Strategies, Learning Activities, and Levels of Blooms/DOK:

Learning Activities:

- 3.1.10 Explore an Access Database

- 3.1.12 Tables and Relationships
- 3.2.11 Create Queries for a School Database
- 3.3.8 Activity: JavaScript Introduction
- 3.4.8 Activity: Basic Python Scripting

Instructional Strategies:

- Summarizing & Note Taking
- Direct Instruction
- Provide opportunities for student practice
- KWL Chart
- Chapter study guide
- Large group discussion

Blooms/DOK:

- Level 1: recall/remember vocabulary
- Level 2: categorize types of databases
- Level 3: compare and contrast programming languages
- Level 4: students apply programming and create several projects in code.org

Technology Materials and Standards:

- http://www.testout.com

TECH.8.1.12	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.12.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.2.12.E.4	Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).

Formative Assessment:

- Anticipatory set
- Closure
- Exit tickets
- Graphic organizers
- Pop-quizzes (not graded)
- Questioning
- Think-pair-share
- Warm-up

Summative Assessment:

- Labs (performance tests)
- Quiz on Databases
- Quiz on Interfacing with Databases
- Quiz on Introduction to Programming
- Quiz on Programming Terms and Concepts

Benchmark Assessments

Skills-based assessment
Reading response
Writing prompt
Lab practical

Alternative Assessments

Performance tasks
Project-based assignments
Problem-based assignments
Presentations
Reflective pieces
Concept maps
Case-based scenarios
Portfolios

Modifications

ELL Modifications:

- Allow alternate responses
- Frequent breaks
- Give advanced notes
- Give extended time
- Model instructions
- Simplify instructions

IEP & 504 Modifications:

- Additional time as needed
- Pair with other students
- Preferential seating
- Print out the text in hardcopy
- Read instructions aloud

G&T Modifications:

- Competitions and collaborative projects
- Curriculum acceleration
- Enrichment activities
- Extracurricular activities
- High expectations
- Independent projects
- Multi-level differentiated curriculum
- Set individual goals
- Special projects (e.g. newsletter)

At Risk Modifications

- Continue to repeat and rephrase the major point(s) of the unit or lesson
- Elicit prior knowledge
- Give very basic introduction
- Include hands-on experiences and manipulatives whenever possible
- Insert meanings of vocabulary continuously throughout the lesson
- Offer copies of lecture notes
- Provide study guides for tests well in advance
- Schedule field trips at the beginning of the unit
- Use graphic organizers

Resources & Materials:

- Online virtual labs
- Video lessons

Computer Science and Design Thinking Standards:

CS.9-12.8.1.12.DA.1	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
CS.9-12.8.1.12.DA.2	Describe the trade-offs in how and where data is organized and stored.
CS.9-12.8.1.12.DA.3	Translate between decimal numbers and binary numbers.
CS.9-12.8.1.12.DA.4	Explain the relationship between binary numbers and the storage and use of data in a computing device.
CS.9-12.8.1.12.DA.5	Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
CS.9-12.8.2.12.ETW.2	Synthesize and analyze data collected to monitor the effects of a technological product or system on the environment.