Unit description
The Cloud Rescue! Koalas unit introduces students to how technology has helped rescue koalas caught in Australia’s devastating wildfires, as well as the key role of cloud computing plays in genomics research efforts to save endangered species from extinction. Students learn about cloud storage via Amazon Simple Storage Service (Amazon S3) buckets, practice structured query language (SQL) with Amazon Athena, and explore how devices send and receive data in the cloud using AWS IoT Core.

This 90-minute unit is broken into two 45-minute modules of multimedia presentations, vocabulary practice, gamified simulation activities, and hands-on labs to help students connect their learning with real-world applications and recognize the role of Big Data conservation genomics to the preservation of biodiversity.

Intended audience
This unit is intended for students and educators:

**Students:**
- At least 13 years or older
- Enrolled in participating AWS Spark secondary school Science, Technology, Engineering, Mathematics (STEM) and/or Computer and Technology Education (CTE) classes

**Educators:**
- Teach STEM and/or CTE classes to eligible secondary school students at a participating AWS Spark school
- Interested in supplemental curricular content designed to highlight the ways in which cloud computing technology is used in the subjects they teach

Recommended delivery method
This unit is designed to be facilitated by an educator in a classroom setting. If necessary, the unit may be delivered in a virtual or "flipped classroom" manner with minimal educator instruction. The unit is accompanied by a detailed Instructor Guide to assist educators with unit delivery.

Prerequisites
We recommend the following prerequisites for students and educators:

**Students:**
- Completed Introduction to the AWS Cloud and Sustainability unit
A basic understanding of DNA and the mechanisms of heredity
A basic understanding of ecological concepts such as biodiversity, endangered species, etc.

**Educators:**
- Completed *Introduction to the AWS Cloud for K-12 Educators* training
- Reviewed the Instructor Guide for *Cloud Rescue! Koalas* unit
- Comfortable explaining high school-level biological and ecological concepts to 13+ year old students

**Technical requirements**
Educators must have:
- Access to a laptop or desktop computer running Windows, Mac or Linux, or a Chromebook
- Access to internet connection
- Access to the AWS Spark Canvas LMS
- Access to the following sites prior to teaching the unit:
  - Educators should ask the school district’s Network Administrator for assistance.
    - labs.vocareum.com
    - labs.vocareum.com.cdn.cloudflare.net
    - proxy*.vocareum.com
    - proxy*.vocareum.com.cdn.cloudflare.net
    - *.aws.amazon.com

**Unit and module objectives**
In this unit, students will:
- Recognize the role of cloud computing and IoT sensors in conservation of endangered species
- Apply basic computer science principles to revise search algorithm parameters to increase precision
- Perform basic data collection and data analysis using Amazon S3 and Amazon Athena to detect genetic traits
- Describe the key concepts of conservation genomics research to improve biodiversity

This unit features two modules, where students will learn and recognize:

**Module 1: Find Koalas using Drones and Cloud Technology**
**Objectives**
- Explain the major factors that may contribute to species extinction
- Describe the kinds of data collected by drones outfitted with IR sensors
- Recognize the role of cloud technology in species preservation

**Module 2: Rescue Koalas Using the AWS Cloud!**
**Objectives**
- Investigate how genetic differences may affect the health of koala populations
- Recognize the importance of genomics research to animal conservation
- Explain the advantages of using cloud technology for genetic sequencing and data analysis
- Explore Amazon Athena SQL queries to gain data insights in genetic research

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Course outline

Module 1: Find Koalas using Drones and Cloud Technology (45 minutes)
- Multimedia Presentation: IoT devices that Can Fly, See, and Track
- Multimedia Presentation: Programming for Accuracy
- Simulation Activity: Spot Koalas using IR-equipped drones
- Check for Understanding

Module 2: Rescue Koalas Using the AWS Cloud! (45 minutes)
- Multimedia Presentation: Technology Comes to the Rescue!
- Interactive Vocabulary Practice: hotspot activity reinforcing unit vocabulary
- Teach: Decode the Koalas
- Hands-on Lab: Rescue Koalas Using the AWS Cloud!
- Interactive Challenges: Biodiversity and habitat management
- Interactive Review: Mitigating human impact on the environment
- Check for Understanding