**Hash Table Data Structure**

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**Hash Table Structure**

// Define Course struct

struct Course

courseNumber: string

title: string

prerequisites: list of strings

// Define Hash Table

class HashTable

table: array of lists (size 100)

function initialize()

table <- array of 100 empty lists

function hash(key: string) returns integer

return sum(ascii values of key) % 100

function insert(course: Course)

index <- hash(course.courseNumber)

table[index].append(course)

function find(courseNumber: string) returns Course

index <- hash(courseNumber)

for course in table[index]

if course.courseNumber == courseNumber

return course

return null

// Function to load data from file

function loadData(filename: string) returns HashTable

coursesHashTable <- new HashTable()

allCourses <- empty list of strings

open file filename for reading

while not end of file

line <- read next line

tokens <- split line by comma

if length of tokens < 2

print "Error: Invalid format on line -", line

continue

course <- new Course(tokens[0].trim(), tokens[1].trim(), tokens[2:].trim())

coursesHashTable.insert(course)

allCourses.append(tokens[0].trim())

for courseNumber in allCourses

course <- coursesHashTable.find(courseNumber)

if course is not null

for prereq in course.prerequisites

if coursesHashTable.find(prereq) is null

print "Error: Prerequisite", prereq, "for course", courseNumber, "does not exist."

close file

return coursesHashTable

// Function to print course information

function printCourses(coursesHashTable: HashTable)

for list in coursesHashTable.table

for course in list

print "Course Number:", course.courseNumber, "Title:", course.title, "Prerequisites:", join(course.prerequisites, ", ") if length of course.prerequisites > 0 else "None"

// Main program

filename <- "course\_information.txt"

coursesHashTable <- loadData(filename)

printCourses(coursesHashTable)