



Complete, fold and seal
(see note 2 below)

FORENAME(S): PETER NEIL

12 Pages

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. **Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.**

List the numbers of the questions you have attempted	Office Use
1	15 ✓
2	24 ✓
3	~~18~~ 21 ✓
Total	~~70~~ /80

(Gweler yr ochr arall am y fersiwn Cymraeg)

QUESTION ONE

- (A) THE CODE SHOWS A FUNCTION COUNTER WHICH HAS A PARAMETER INITIAL COUNT PASSED IN, THIS IS THEN INITIALISED AS A PROPERTY IN THE VARIABLE -COUNT; ~~HASD~~ INSIDE THE COUNTER FUNCTION TWO MORE FUNCTIONS EXIST, COUNT() WHICH SIMPLY INCREMENTS THE COUNT BY INCREMENTING THE -COUNT; PROPERTY, AND RESETCOUNT() WHICH SETS THE VALUE OF -COUNT; BACK TO 0, THUS RESETING THE COUNT. THESE TWO FUNCTIONS ARE THEN RETURNED AS FUNCTIONS NEXT + RESET.

A COUNTER IS THEN CREATED USING THE 'NEW' KEYWORD AND STORED IN VARIABLE COUNTER, ~~THE NEXT AND RESET~~ WITH A VALUE OF 0 PASSED IN AS THE VALUE OF INITIALCOUNT (-COUNT). THE NEXT AND RESET FUNCTIONS ARE THEN CALLED ON THE COUNTER OBJECT.

3.5 ✓

THE REVEALING MODULE PATTERN ALLOWS FOR FUNCTIONS INSIDE CLASSES TO ACT LIKE OBJECTS AND BE CREATED LIKE OBJECTS AND USED IN THAT CLASS. X

- (B) THE CROSS ORIGIN RESOURCE SHARING (CORS) PROBLEM IS OCCURRING AS THE RESOURCES WHICH THE WEB SERVER IS TRYING TO REQUEST EXIST ON ANOTHER SERVER(S). FOR SECURITY REASONS REQUESTS FOR RESOURCES OVER HTTP ARE PROHIBITED ON DIFFERENT SERVERS.

5.5 ✓

MOST MODERN BROWSERS PROVIDE A SOLUTION TO THIS BUILT IN BY ADDING IN AN EXTRA PIECE OF DATA INTO THE REQUEST BODY HEADERS TO ALLOW ACCESS TO RESOURCES ON OTHER SERVERS.

5.5 ✓

A FURTHER SOLUTION TO THIS IS TO MANUALLY ADD SECURITY DATA INFORMATION TO THE REQUEST BODY HEADERS TO ALLOW ACCESS ^{FROM THE SERVERS TO BE ACCESSED}.

③ TYPESCRIPT ALLOWS PROGRAMMERS TO WRITE JAVASCRIPT IN A STRUCTURED MANNER TAKING ADVANTAGE OF CLASSES, INHERITANCE, INTERFACES AND POLYMORPHISM.

TYPESCRIPT ALSO ALLOWS PROGRAMMERS TO WRITE JAVASCRIPT, WHICH IS USUALLY WEAKLY TYPED, IN A STRONGLY TYPED ~~LANGUAGE~~ WAY WHICH ALLOWS FOR GREATER FLEXIBILITY AND & MAKES THE CODE EASIER TO UNDERSTAND AND WRITE.

TYPESCRIPT SIMPLY COMPILES DOWN TO NATIVE JAVASCRIPT.

IT ALLOWS PROGRAMMER TO APPLY OBJECT ORIENTED PRINCIPLES TO JAVASCRIPT.

IT ALLOWS FOR DECLARATION OF VARIABLE AND RETURN TYPES, THUS MAKING JAVASCRIPT 'STRONGLY TYPED'

Mark
agreed

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QUESTION TWO

① THE FOUR V'S OF BIG DATA ARE: VOLUME, VELOCITY, VARIETY AND VERACITY, WHERE;

VOLUME

REFERS TO THE SHEER AMOUNT OF DATA INVOLVED. EXABYTES AND EVEN PETTABYTES OF DATA.

VARIETY

IS THE DIFFERENT TYPES OF DATA STORED. IN BIG DATA SCHEMAS, THIS COULD BE TEXT, AUDIO, VIDEO, SENSOR INFORMATION ETC. BIG-DATA IS MADE UP OF 3 CLASSIFICATIONS OF DATA, STRUCTURED, SEMI-STRUCTURED AND UNSTRUCTURED.

VELOCITY

THIS REFERS TO THE SPEED AT WHICH DATA IS COLLECTED, WITH THE VAST VARIETY OF DATA COMING IN, THE SPEED IT CAN BE PROCESSED IS IMPORTANT. THIS IS USUALLY PROCESSED BY THE SPEED LAYER IN THE LAMBDA ARCHITECTURE.

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VERACITY

VERACITY REFERS TO THE QUALITY OF THE DATA COMING IN AND BEING PROCESSED.

NOTE: THERE ARE OTHER CHARACTERISTICS OF BIG DATA, BUT THESE ARE THE MAIN FOUR.

- (B) ~~THE~~ MAP REDUCE PROCESS IS BENEFICIAL AS IT COMPRESSES DOWN DATA TO SMALLER, MORE MANAGABLE SIZES. ^{TO BE STORED} IN AN ORGANISED MANNER.

FIRSTLY, THE MAP FUNCTION SPLITS UP THE DATA AND ADDS A COUNT TO EACH PROPERTY SPLIT. IN THE EXAMPLE GIVEN, EACH SENTENCE OR PHRASE IS SPLIT INTO A SINGULAR WORD, WITH A COUNT ATTACHED TO IT. AT THIS STAGE DATA IS SIMPLY MAPPED TO A VALUE, SO DUPLICATE VALUES ARE NOT CALCULATED HERE.

THE NEXT PROCESS IS SHUFFLE + SORT WHICH GROUPS ALL THE ~~SIMILAR~~ ~~MA~~ MATCHING PIECES OF DATA TOGETHER, ~~THE~~ GO READY FOR THE REDUCE STAGE.

THE REDUCE STAGE NOW CALCULATES THE SUM OF EACH MATCHING KEY VALUE PAIR TO FURTHER COMPRESS THE DATA, FOR EXAMPLE, 'ARE 1' AND 'ARE 1' BECOME 'ARE 2', THUS REDUCING THE AMOUNT OF MEMORY NEEDED TO STORE THE DATA.

THE FINAL OUTPUT COMBINES ALL THE DATA IN ITS COMPRESSED AND REDUCED FORM. ~~AND~~ ~~PREPARES~~ ~~AT~~ ~~THE~~

- (C) DATA SHOULD NEVER BE MODIFIED OR DELETED AS DATA CAN ALWAYS HAVE VALUE FOR ANALYSIS. FURTHERMORE, ALLOWING FOR THE MODIFICATION AND DELETION OF DATA WOULD COMPLEXIFY BIG DATA SCHEMAS, SOMETHING WHICH THEY TRY TO AVOID. BIG DATA SYSTEMS EMERGED AS RELATIONAL DATABASES WERE TO 'COMPLEX'.

OR REPRESENTATIONAL STATE TRANSFER.

QUESTION 3

ARCHITECTURAL STYLE

- (A) REST[^] IS A POPULAR CHOICE FOR WEB APPLICATIONS TODAY BECAUSE IT TRANSFERS DATA OVER HTTP AND FOLLOWS FOUR GOOD PRINCIPLES OF DESIGN.

EXPLICIT USE OF HTTP METHODS

REST USES 8 HTTP METHODS TO REQUEST INFORMATION FROM A WEB SERVER, THERE ARE FOUR POPULAR ONES;

GET - ^r (READS) REQUESTS RESOURCES FROM THE SERVER.

POST - ^c CREATES RESOURCES

PUT - ^u UPDATES OR MODIFIES STATE OR RESOURCES

DELETE - ^d DELETES RESOURCES.

REST IS POPULAR AS...

- IT IS CONSIDERED THAT THESE 4 HTTP METHOD^s HAVE A ONE-TO-ONE MAPPING WITH CREATE, READ, UPDATE AND DELETE OPERATIONS, MAKING QUERYING OF RESOURCES ON A DATABASE/ SERVER EASIER TO UNDERSTAND.

THE GET, PUT AND DELETE METHODS SEND THE VALUE PAIR PARAMETERS IN THE URI ~~OF~~ (UNIFORM RESOURCE IDENTIFIER) OF THE REQUEST, WHICH IS SEEN IN THE BROWSER'S ADDRESS BAR.

THE POST AND PUT METHOD~~s~~ REQUEST SHOULD BE SENT IN THE BODY OF THE REQUEST.

STATELESS

REST ~~SE~~ SERVICES ARE STATELESS (P10).

MEANING THAT NO STATE INFORMATION IS STORED ON THE SERVER, MEANING EVERY HTTP REQUEST IS EXCLUSIVE. THIS INFORMATION MUST BE STORED ON THE CLIENT. WHICH IS WHY AJAX AND REST WORK WELL TOGETHER.

REST URIs FOLLOW FILE STRUCTURE PATTERN

THE URIs WHICH REST RESOURCE REQUESTS ARE SENT FOLLOW AN INTUITIVE, RECOGNISABLE, STRONG AND SIMPLE FORMAT, WHICH RESEMBLES A FILE TREE STRUCTURE ON ANY COMPUTER, FOR EXAMPLE A REST URI MAY LOOK LIKE:

`HTTPS://YOUR-API.COM/RESOURCE/{RESOURCEID}`

REST DATA TRANSFER.

REST SERVICES CAN TRANSFER DATA IN BOTH XML AND JSON FORMAT OR EVEN BOTH, HOWEVER JSON IS MORE LIGHTWEIGHT, EASIER TO CONSUME AND IS WRITTEN IN NATIVE JS.

(B) AJAX Pull AND Push :

Pull IS WHERE THE BROWSER USES AJAX AND A TIMER TO DYNAMICALLY AND ASYNCHRONOUSLY REQUEST RESOURCES ON A SERVER.

PUSH IS WHERE RESOURCES ARE AUTOMATICALLY PUSHED TO THE CLIENT WHENEVER A CHANGE IN RESOURCE ^{OR STATE} HAPPENS.

BOTH HAVE A USE IN A GIVEN SITUATION, HOWEVER PUSH PLACES A LOT OF STRAIN ON THE SERVER.

Mark 55 part 2 (29)



AS THE CONNECTION TO THE CLIENT IS KEPT OPEN AT ALL TIMES. THIS TECHNIQUE IS GOOD IF YOU DO NOT KNOW WHEN RESOURCES ARE LIKELY TO CHANGE, OR, ARE CONSTANTLY CHANGING.

IF A ROUGH ESTIMATE OF HOW OFTEN RESOURCES ARE CHANGING THEN PULL IS THE BETTER OPTION AS IT CAN BE SET UP TO MAKE REQUESTS FOR RESOURCES AT SET INTERVALS, THUS PLACING LESS STRAIN ON THE SERVER.

Mark agreed 21

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