

Operating systems, security and networks (207SE)

Lab 17: TCP Server

Your task

Modify the given TCP server (use the `tcp_server.cc` and `tcp_client.cc` and `Makefile` code on moodle) to create either a) or b). **Do not do both:**

- a) Simple RPN (Reverse Polish Notation) calculator server. For example, if the client sends three inputs (3, 5 and +), then the server will return 8. You should allow addition, subtraction, multiplication and division. (Up to 3 out of 5)

Extend the program to allow more general calculations by implementing a stack for values and operators that apply to the top pair. Example, if the client sends the input (3 5 6 + *) 5 and 6 should be added together and the result multiplied by 3. See the Wikipedia article on RPN for a good description. (for up to 5 out of 5)

- b) A simple parsing system based on the grammar rules below. The system should do the following:
- The client passes a sentence to the server from the user.
 - The server identifies if the sentence is correct in terms of the grammar rules.
 - The server returns to the client if the sentence is grammatically correct or not.
 - The client displays whether the sentence is grammatically correct. (up to 3 marks)

Extend the program so the client displays why the sentence is not correct. (for up to 5 out of 5)

Grammar rules

Correct sentence structure = <agent word> <action word> <object word>

Correct sentence structure = <agent word> <action word> <colour word> <object word>

Correct sentence structure = <agent> <action> <direction>

Correct sentence structure = <pronoun> <action> <object>

Correct sentence structure = <pronoun> <action> <colour> <object>

Correct sentence structure = <pronoun> <action> <direction>

Words marking up vocabulary

Agent Word:- bot
Peter
Jane

Action words:- pick
lift
get
drive
go

Direction word:- forward
backwards
left
right

Colour word:- red
green
brown
blue

Objects words:- nuts
plum
car
cup

Pronoun word:- I
you
we

Examples of grammatically correct and incorrect inputs

bot pick car	✓	We drop cup	✓
Jane go blue plum	✓	bot lift left	✓
bot pick plum plum	x	drop cup	x
nut go right	x	left left right	x
Bot drive car	✓	Bot get brown nuts	✓
I go brown plum	✓		

Example reason why the sentence is not correct

left left car – you have an <action word> followed by an <action word> which is not correct sentence structure.

Evidence

- Source code, with *sensible* comments saying how you client-server code creates a RPN calculator or parser.
- Output of the program showing it solving basic and more complex examples of the reverse polish notation or grammar parser.