Alex Manasoiu

Threaded Server and Client

Server description: First the server starts up by creating a socket object, binding the localhost and port 50007 to that socket, and then listens for up to 5 clients. Afterword, when a client connects to the server, it starts a thread for that specific client, where it then receives the data (if the client input a correct input i.e. something with an "*") and searches the wordlist it has stored for all words matching the query from the client, storing all found words onto a found list. If the stored found list is empty, then the server sends back a response saying there are no words and if the list isn't empty, it just sends the list. After this, it waits again for another query from the client. When the client terminates through "quit" the thread is then stopped

Client description: The client starts by creating a socket and attempts to connect to localhost on port 5007. When connected, the user is prompted to `"Input word with '*' in the middle:  ".` If the user inputs the wrong type of query, the client tells the user to try again. If "quit" is entered the client closes the connection. Lastly, if the user inputs the correct type of query, then it receives a list of the resulting query, where it then prompts the user again for a query.

Tradeoffs: No tradeoffs were really made, as the server and client were made to function exactly as needed, with the specific limitations and feedback from server properly implemented into the client and server. Additionally, there doesn't seem to be any cases for which the programs do not work.

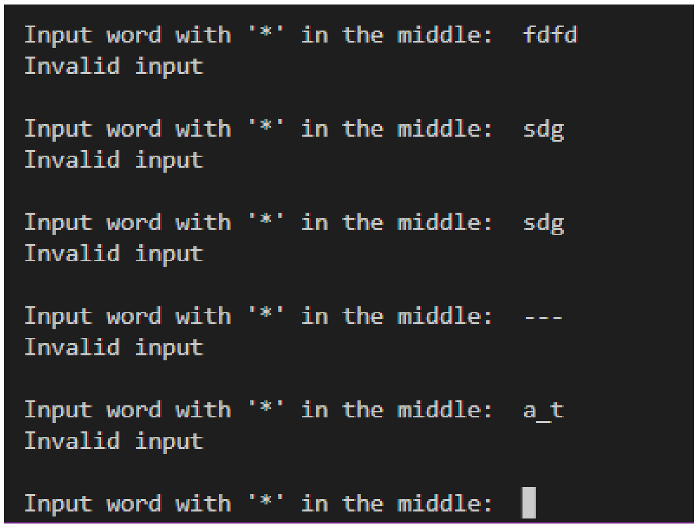
Extensions: Some extensions of the client and server I thought of (whether or not they are actually needed) was the ability for the server or the client to blacklist certain words from the list, such as if you wanted to say that the word "food" should be excluded when something like "f*d" is queried by the client.

Test cases:

There were 7 distinct test cases that were used to test functionality, testing for:

1. Program properly detects if no * is used:

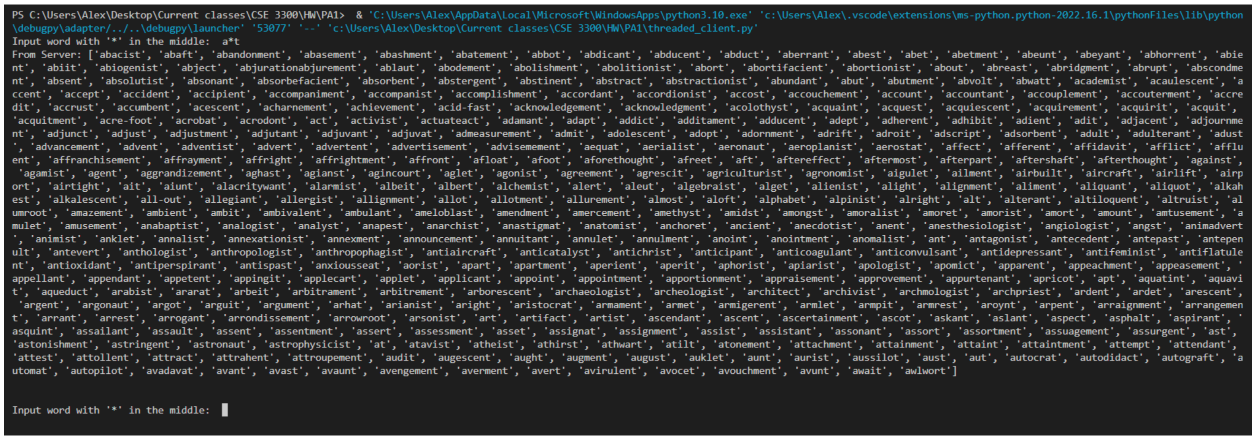
   The first inputs from the client were inputted as “dtag”, “at”, etc, testing if the client makes sure that the input is in the correct format, and if not, sends an error message, prompting for an input again.



```
Input word with '*' in the middle:  fdfd
Invalid input

Input word with '*' in the middle:  sdg
Invalid input

Input word with '*' in the middle:  sdg
Invalid input

Input word with '*' in the middle:  ---
Invalid input

Input word with '*' in the middle:  a_t
Invalid input

Input word with '*' in the middle:  
```

2. If it has an * in the middle

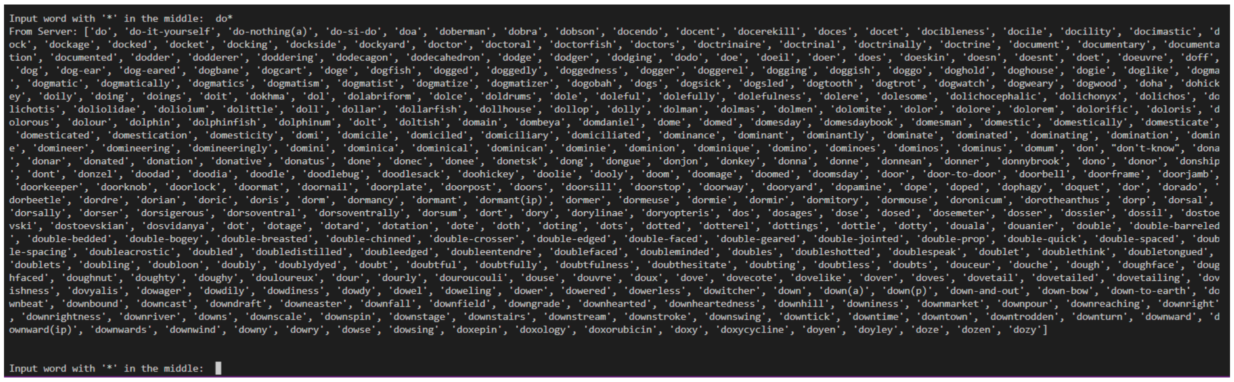
   Tests such as “a*t” (as given in our assignment) in order to see if the server sends back a list of words that begin with a beginning of “a” and ends with “t”, which is correctly implemented.



```
PS C:\Users\Alex\Desktop\Current classes\CSE 3300\HW\PA1>  & 'C:\Users\Alex\AppData\Local\Microsoft\WindowsApps\python3.10.exe' 'c:\Users\Alex\.vscode\extensions\ms-python.python-2022.16.1\pythonFiles\lib\python
\debugpy\adapter/../..\debugpy\launcher' '53077' '--' 'c:\Users\Alex\Desktop\Current classes\CSE 3300\HW\PA1\threaded_client.py'
Input word with '*' in the middle:  a*t
From Server: ['abacist', 'abaft', 'abandonment', 'abasement', 'abashment', 'abatement', 'abbot', 'abdicant', 'abducent', 'abduct', 'aberrant', 'abest', 'abet', 'abetment', 'abeunt', 'abeyant', 'abhorrent', 'abie
nt', 'abiit', 'abiogenist', 'abject', 'abjurationabjurement', 'ablaut', 'abodement', 'abolishment', 'abolitionist', 'abort', 'abortifacient', 'abortionist', 'about', 'abreast', 'abridgment', 'abrupt', 'abscondme
nt', 'absent', 'absolutist', 'absonant', 'absorbefacient', 'absorbent', 'abstergent', 'abstinent', 'abstract', 'abstractionist', 'abundant', 'abut', 'abutment', 'abvolt', 'abwatt', 'academist', 'acaulescent', 'a
ccent', 'accept', 'accident', 'accipient', 'accompaniment', 'accompanist', 'accomplishment', 'accordant', 'accordionist', 'accost', 'accouchement', 'account', 'accountant', 'accouplement', 'accouterment', 'accre
dit', 'accrust', 'accumbent', 'acescent', 'acharnement', 'achievement', 'acid-fast', 'acknowledgement', 'acknowledgment', 'acolothyst', 'acquaint', 'acquest', 'acquiescent', 'acquirement', 'acquirit', 'acquit',
'acquitment', 'acre-foot', 'acrobat', 'acrodont', 'act', 'activist', 'actuateact', 'adamant', 'adapt', 'addict', 'additament', 'adducent', 'adept', 'adherent', 'adhibit', 'adient', 'adit', 'adjacent', 'adjournme
nt', 'adjunct', 'adjust', 'adjustment', 'adjutant', 'adjuvant', 'adjuvat', 'admeasurement', 'admit', 'adolescent', 'adopt', 'adornment', 'adrift', 'adroit', 'adscript', 'adsorbent', 'adult', 'adulterant', 'adust
', 'advancement', 'advent', 'adventist', 'advert', 'advertent', 'advertisement', 'advisemement', 'aequat', 'aerialist', 'aeronaut', 'aeroplanist', 'aerostat', 'affect', 'afferent', 'affidavit', 'afflict', 'afflu
ent', 'affranchisement', 'affrayment', 'affright', 'affrightment', 'affront', 'afloat', 'afoot', 'aforethought', 'afreet', 'aft', 'aftereffect', 'aftermost', 'afterpart', 'aftershaft', 'afterthought', 'against',
 'agamist', 'agent', 'aggrandizement', 'aghast', 'agianst', 'agincourt', 'aglet', 'agonist', 'agreement', 'agrescit', 'agriculturist', 'agronomist', 'aigulet', 'ailment', 'airbuilt', 'aircraft', 'airlift', 'airp
ort', 'airtight', 'ait', 'aiunt', 'alacritywant', 'alarmist', 'albeit', 'albert', 'alchemist', 'alert', 'aleut', 'algebraist', 'alget', 'alienist', 'alight', 'alignment', 'aliment', 'aliquant', 'aliquot', 'alkah
est', 'alkalescent', 'all-out', 'allegiant', 'allergist', 'allignment', 'allot', 'allotment', 'allurement', 'almost', 'aloft', 'alphabet', 'alpinist', 'alright', 'alt', 'alterant', 'altiloquent', 'altruist', 'al
umroot', 'amazement', 'ambient', 'ambit', 'ambivalent', 'ambulant', 'ameloblast', 'amendment', 'amercement', 'amethyst', 'amidst', 'amongst', 'amoralist', 'amoret', 'amorist', 'amort', 'amount', 'amtusement', 'a
mulet', 'amusement', 'anabaptist', 'analogist', 'analyst', 'anapest', 'anarchist', 'anastigmat', 'anatomist', 'anchoret', 'ancient', 'anecdotist', 'anent', 'anesthesiologist', 'angiologist', 'angst', 'animadvert
', 'animist', 'anklet', 'annalist', 'annexationist', 'annexment', 'announcement', 'annuitant', 'annulet', 'annulment', 'anoint', 'anointment', 'anomalist', 'ant', 'antagonist', 'antecedent', 'antepast', 'antepen
ult', 'antevert', 'anthologist', 'anthropologist', 'anthropophagist', 'antiaircraft', 'anticatalyst', 'antichrist', 'anticipant', 'anticoagulant', 'anticonvulsant', 'antidepressant', 'antifeminist', 'antiflatule
nt', 'antioxidant', 'antiperspirant', 'antispast', 'anxiousseat', 'aorist', 'apart', 'apartment', 'aperient', 'aperit', 'aphorist', 'apiarist', 'apologist', 'apomict', 'apparent', 'appeachment', 'appeasement', '
appellant', 'appendant', 'appetent', 'appingit', 'applecart', 'applet', 'applicant', 'appoint', 'appointment', 'apportionment', 'appraisement', 'approvement', 'appurtenant', 'apricot', 'apt', 'aquatint', 'aquavi
t', 'aqueduct', 'arabist', 'ararat', 'arbeit', 'arbitrament', 'arbitrement', 'arborescent', 'archaeologist', 'archeologist', 'architect', 'archivist', 'archmologist', 'archpriest', 'ardent', 'ardet', 'arescent',
 'argent', 'argonaut', 'argot', 'arguit', 'argument', 'arhat', 'arianist', 'aright', 'aristocrat', 'armament', 'armet', 'armigerent', 'armlet', 'armpit', 'armrest', 'aroynt', 'arpent', 'arraignment', 'arrangemen
t', 'arrant', 'arrest', 'arrogant', 'arrondissement', 'arrowroot', 'arsonist', 'art', 'artifact', 'artist', 'ascendant', 'ascent', 'ascertainment', 'ascot', 'askant', 'aslant', 'aspect', 'asphalt', 'aspirant', '
asquint', 'assailant', 'assault', 'assent', 'assentment', 'assert', 'assessment', 'asset', 'assignat', 'assignment', 'assist', 'assistant', 'assonant', 'assort', 'assortment', 'assuagement', 'assurgent', 'ast',
'astonishment', 'astringent', 'astronaut', 'astrophysicist', 'at', 'atavist', 'atheist', 'athirst', 'athwart', 'atilt', 'atonement', 'attachment', 'attainment', 'attaint', 'attaintment', 'attempt', 'attendant',
'attest', 'attollent', 'attract', 'attrahent', 'attroupement', 'audit', 'augescent', 'aught', 'augment', 'august', 'auklet', 'aunt', 'aurist', 'aussilot', 'aust', 'aut', 'autocrat', 'autodidact', 'autograft', 'a
utomat', 'autopilot', 'avadavat', 'avant', 'avast', 'avaunt', 'avengement', 'averment', 'avert', 'avirulent', 'avocet', 'avouchment', 'avunt', 'await', 'awlwort']


Input word with '*' in the middle:  
```

3. Working with * at the end of the query

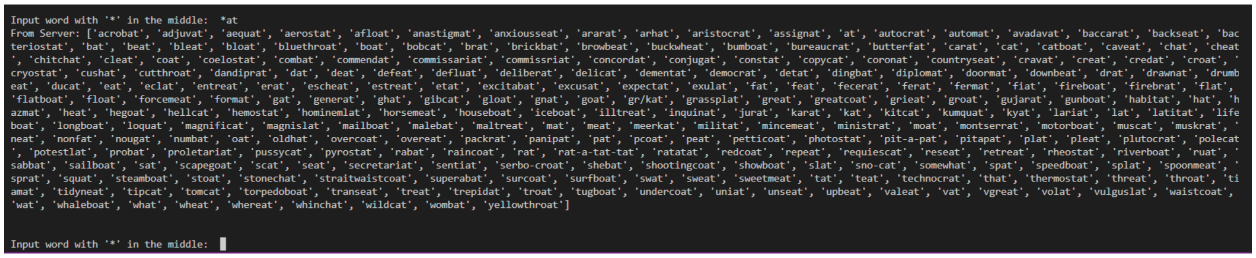
   Tests such as “do*” in order to see if the server sends back a list of words that begin with “do”, which is correctly implemented.



```
Input word with '*' in the middle:  do*
From Server: ['do', 'do-it-yourself', 'do-nothing(a)', 'do-si-do', 'doa', 'doberman', 'dobra', 'dobson', 'docendo', 'docent', 'docerekill', 'doces', 'docet', 'docibleness', 'docile', 'docility', 'docimastic', 'd
ock', 'dockage', 'docked', 'docket', 'docking', 'dockside', 'dockyard', 'doctor', 'doctoral', 'doctorfish', 'doctors', 'doctrinaire', 'doctrinal', 'doctrinally', 'doctrine', 'document', 'documentary', 'documenta
tion', 'documented', 'dodder', 'dodderer', 'doddering', 'dodecagon', 'dodecahedron', 'dodge', 'dodger', 'dodging', 'dodo', 'doe', 'doeil', 'doer', 'does', 'doeskin', 'doesn', 'doesnt', 'doet', 'doeuvre', 'doff',
 'dog', 'dog-ear', 'dog-eared', 'dogbane', 'dogcart', 'doge', 'dogfish', 'dogged', 'doggedly', 'doggedness', 'dogger', 'doggerel', 'dogging', 'doggish', 'doggo', 'doghold', 'doghouse', 'dogie', 'doglike', 'dogma
', 'dogmatic', 'dogmatically', 'dogmatics', 'dogmatism', 'dogmatist', 'dogmatize', 'dogmatizer', 'dogobah', 'dogs', 'dogsick', 'dogsled', 'dogtooth', 'dogtrot', 'dogwatch', 'dogweary', 'dogwood', 'doha', 'dohick
ey', 'doily', 'doing', 'doings', 'doit', 'dokhma', 'dol', 'dolabriform', 'dolce', 'doldrums', 'dole', 'doleful', 'dolefully', 'dolefulness', 'dolere', 'dolesome', 'dolichocephalic', 'dolichonyx', 'dolichos', 'do
lichotis', 'doliolidae', 'doliolum', 'dolittle', 'doll', 'dollar', 'dollarfish', 'dollhouse', 'dollop', 'dolly', 'dolman', 'dolmas', 'dolmen', 'dolomite', 'dolor', 'dolore', 'dolorem', 'dolorific', 'doloris', 'd
olorous', 'dolour', 'dolphin', 'dolphinfish', 'dolphinum', 'dolt', 'doltish', 'domain', 'dombeya', 'domdaniel', 'dome', 'domed', 'domesday', 'domesdaybook', 'domesman', 'domestic', 'domestically', 'domesticate',
 'domesticated', 'domestication', 'domesticity', 'domi', 'domicile', 'domiciled', 'domiciliary', 'domiciliated', 'dominance', 'dominant', 'dominantly', 'dominate', 'dominated', 'dominating', 'domination', 'domin
e', 'domineer', 'domineering', 'domineeringly', 'domini', 'dominica', 'dominical', 'dominican', 'dominie', 'dominion', 'dominique', 'domino', 'dominoes', 'dominos', 'dominus', 'domum', 'don', "don't-know", 'dona
', 'donar', 'donated', 'donation', 'donative', 'donatus', 'done', 'donec', 'donee', 'donetsk', 'dong', 'dongue', 'donjon', 'donkey', 'donna', 'donne', 'donnean', 'donner', 'donnybrook', 'dono', 'donor', 'donship
', 'dont', 'donzel', 'doodad', 'doodia', 'doodle', 'doodlebug', 'doodlesack', 'doohickey', 'doolie', 'dooly', 'doom', 'doomage', 'doomed', 'doomsday', 'door', 'door-to-door', 'doorbell', 'doorframe', 'doorjamb',
 'doorkeeper', 'doorknob', 'doorlock', 'doormat', 'doornail', 'doorplate', 'doorpost', 'doors', 'doorsill', 'doorstop', 'doorway', 'dooryard', 'dopamine', 'dope', 'doped', 'dophagy', 'doquet', 'dor', 'dorado', '
dorbeetle', 'dordre', 'dorian', 'doric', 'doris', 'dorm', 'dormancy', 'dormant', 'dormant(ip)', 'dormer', 'dormeuse', 'dormie', 'dormir', 'dormitory', 'dormouse', 'doronicum', 'dorotheanthus', 'dorp', 'dorsal',
'dorsally', 'dorser', 'dorsigerous', 'dorsoventral', 'dorsoventrally', 'dorsum', 'dort', 'dory', 'dorylinae', 'doryopteris', 'dos', 'dosages', 'dose', 'dosed', 'dosemeter', 'dosser', 'dossier', 'dossil', 'dostoe
vski', 'dostoevskian', 'dosvidanya', 'dot', 'dotage', 'dotard', 'dotation', 'dote', 'doth', 'doting', 'dots', 'dotted', 'dotterel', 'dottings', 'dottle', 'dotty', 'douala', 'douanier', 'double', 'double-barreled
', 'double-bedded', 'double-bogey', 'double-breasted', 'double-chinned', 'double-crosser', 'double-edged', 'double-faced', 'double-geared', 'double-jointed', 'double-prop', 'double-quick', 'double-spaced', 'doub
le-spacing', 'doubleacrostic', 'doubled', 'doubledistilled', 'doubleedged', 'doubleentendre', 'doublefaced', 'doubleminded', 'doubles', 'doubleshotted', 'doublespeak', 'doublet', 'doublethink', 'doubletongued',
'doublets', 'doubling', 'doubloon', 'doubly', 'doublydyed', 'doubt', 'doubtful', 'doubtfully', 'doubtfulness', 'doubthesitate', 'doubting', 'doubtless', 'doubts', 'douceur', 'douche', 'dough', 'doughface', 'doug
hfaced', 'doughnut', 'doughty', 'doughy', 'douloureux', 'dour', 'dourly', 'douroucouli', 'douse', 'douvre', 'doux', 'dove', 'dovecote', 'dovelike', 'dover', 'doves', 'dovetail', 'dovetailed', 'dovetailing', 'dov
ishness', 'dovyalis', 'dowager', 'dowdily', 'dowdiness', 'dowdy', 'dowel', 'doweling', 'dower', 'dowered', 'dowerless', 'dowitcher', 'down', 'down(a)', 'down(p)', 'down-and-out', 'down-bow', 'down-to-earth', 'do
wnbeat', 'downbound', 'downcast', 'downdraft', 'downeaster', 'downfall', 'downfield', 'downgrade', 'downhearted', 'downheartedness', 'downhill', 'downiness', 'downmarket', 'downpour', 'downreaching', 'downright'
, 'downrightness', 'downriver', 'downs', 'downscale', 'downspin', 'downstage', 'downstairs', 'downstream', 'downstroke', 'downswing', 'downtick', 'downtime', 'downtown', 'downtrodden', 'downturn', 'downward', 'd
ownward(ip)', 'downwards', 'downwind', 'downy', 'dowry', 'dowse', 'dowsing', 'doxepin', 'doxology', 'doxorubicin', 'doxy', 'doxycycline', 'doyen', 'doyley', 'doze', 'dozen', 'dozy']


Input word with '*' in the middle:
```

4. Working with * at the beginning

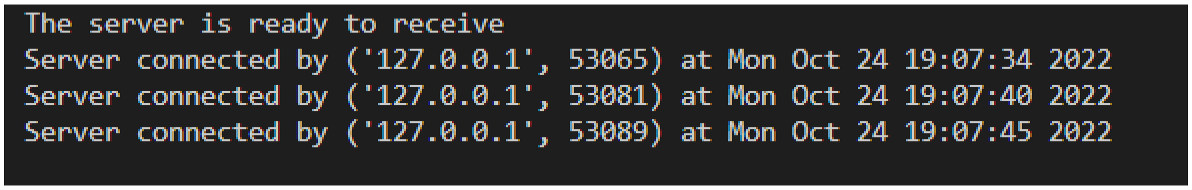
   Test cases sent were things like “*ed” and “*at”, testing to see if the server correctly gives back a list with words that end with that ending.



```
Input word with '*' in the middle:  *at
From Server: ['acrobat', 'adjuvat', 'aequat', 'aerostat', 'afloat', 'anastigmat', 'anxiousseat', 'ararat', 'arhat', 'aristocrat', 'assignat', 'at', 'autocrat', 'automat', 'avadavat', 'baccarat', 'backseat', 'bac
teriostat', 'bat', 'beat', 'bleat', 'bloat', 'bluethroat', 'boat', 'bobcat', 'brat', 'brickbat', 'browbeat', 'buckwheat', 'bumboat', 'bureaucrat', 'butterfat', 'carat', 'cat', 'catboat', 'caveat', 'chat', 'cheat
', 'chitchat', 'cleat', 'coat', 'coelostat', 'combat', 'commendat', 'commissariat', 'commissriat', 'concordat', 'conjugat', 'constat', 'copycat', 'coronat', 'countryseat', 'cravat', 'creat', 'credat', 'croat', '
cryostat', 'cushat', 'cutthroat', 'dandiprat', 'dat', 'deat', 'defeat', 'defluat', 'deliberat', 'delicat', 'dementat', 'democrat', 'detat', 'dingbat', 'diplomat', 'doormat', 'downbeat', 'drat', 'drawnat', 'drumb
eat', 'ducat', 'eat', 'eclat', 'entreat', 'erat', 'escheat', 'estreat', 'etat', 'excitabat', 'excusat', 'expectat', 'exulat', 'fat', 'feat', 'fecerat', 'ferat', 'fermat', 'fiat', 'fireboat', 'firebrat', 'flat',
'flatboat', 'float', 'forcemeat', 'format', 'gat', 'generat', 'ghat', 'gibcat', 'gloat', 'gnat', 'goat', 'gr/kat', 'grassplat', 'great', 'greatcoat', 'grieat', 'groat', 'gujarat', 'gunboat', 'habitat', 'hat', 'h
azmat', 'heat', 'hegoat', 'hellcat', 'hemostat', 'hominemlat', 'horsemeat', 'houseboat', 'iceboat', 'illtreat', 'inquinat', 'jurat', 'karat', 'kat', 'kitcat', 'kumquat', 'kyat', 'lariat', 'lat', 'latitat', 'life
boat', 'longboat', 'loquat', 'magnificat', 'magnislat', 'mailboat', 'malebat', 'maltreat', 'mat', 'meat', 'meerkat', 'militat', 'mincemeat', 'ministrat', 'moat', 'montserrat', 'motorboat', 'muscat', 'muskrat', '
neat', 'nonfat', 'nougat', 'numbat', 'oat', 'oldhat', 'overcoat', 'overeat', 'packrat', 'panipat', 'pat', 'pcoat', 'peat', 'petticoat', 'photostat', 'pit-a-pat', 'pitapat', 'plat', 'pleat', 'plutocrat', 'polecat
', 'potestlat', 'probat', 'proletariat', 'pussycat', 'pyrostat', 'rabat', 'raincoat', 'rat', 'rat-a-tat-tat', 'ratatat', 'redcoat', 'repeat', 'requiescat', 'reseat', 'retreat', 'rheostat', 'riverboat', 'ruat', '
sabbat', 'sailboat', 'sat', 'scapegoat', 'scat', 'seat', 'secretariat', 'sentiat', 'serbo-croat', 'shebat', 'shootingcoat', 'showboat', 'slat', 'sno-cat', 'somewhat', 'spat', 'speedboat', 'splat', 'spoonmeat', '
sprat', 'squat', 'steamboat', 'stoat', 'stonechat', 'straitwaistcoat', 'superabat', 'surcoat', 'surfboat', 'swat', 'sweat', 'sweetmeat', 'tat', 'teat', 'technocrat', 'that', 'thermostat', 'threat', 'throat', 'ti
amat', 'tidyneat', 'tipcat', 'tomcat', 'torpedoboat', 'transeat', 'treat', 'trepidat', 'troat', 'tugboat', 'undercoat', 'uniat', 'unseat', 'upbeat', 'valeat', 'vat', 'vgreat', 'volat', 'vulguslat', 'waistcoat',
'wat', 'whaleboat', 'what', 'wheat', 'whereat', 'whinchat', 'wildcat', 'wombat', 'yellowthroat']


Input word with '*' in the middle:
```

5. Does the server allow multiple connections at once

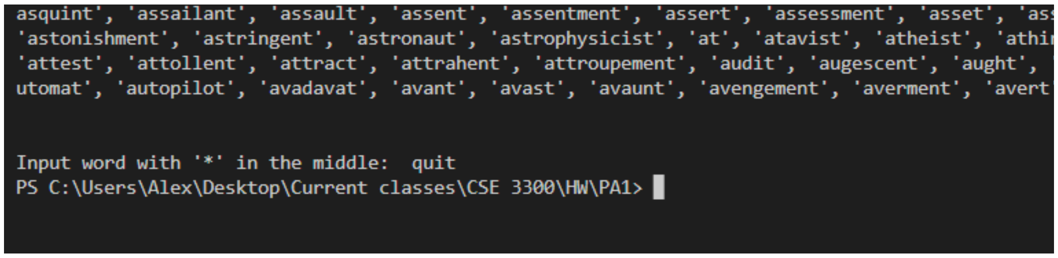
   All that was done in order to test this functionality was to start 5 different terminals and see if the server can handle it. Multiple different queries were done for the clients and each one worked completely fine.



```
The server is ready to receive
Server connected by ('127.0.0.1', 53065) at Mon Oct 24 19:07:34 2022
Server connected by ('127.0.0.1', 53081) at Mon Oct 24 19:07:40 2022
Server connected by ('127.0.0.1', 53089) at Mon Oct 24 19:07:45 2022
```

6. "Quit" works:

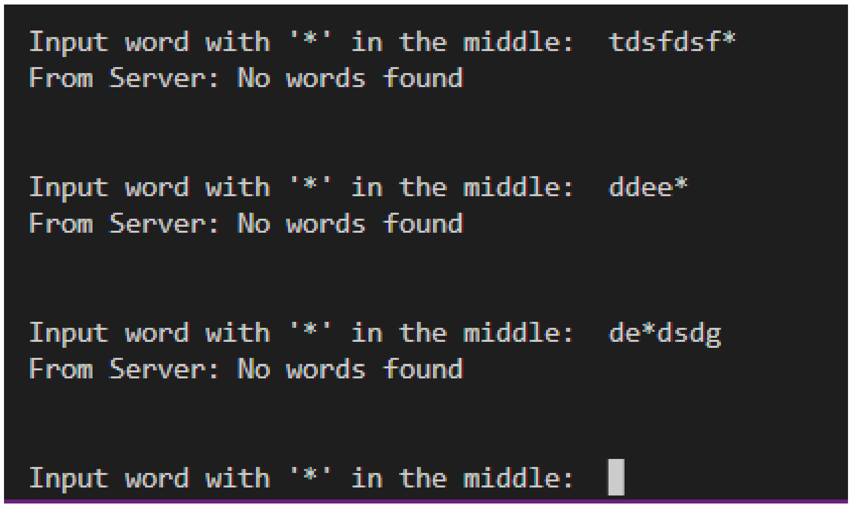
   After testing out the rest of the functionalities, the simple test of just typing in "quit" into the input was done, seeing if the client would then shut down and close the connection, which it successfully did.



```
asquint', 'assailant', 'assault', 'assent', 'assentment', 'assert', 'assessment', 'asset', 'as
'astonishment', 'astringent', 'astronaut', 'astrophysicist', 'at', 'atavist', 'atheist', 'athi
'attest', 'attollent', 'attract', 'attrahent', 'attroupement', 'audit', 'augescent', 'aught',
utomat', 'autopilot', 'avadavat', 'avant', 'avast', 'avaunt', 'avengement', 'averment', 'avert


Input word with '*' in the middle:  quit
PS C:\Users\Alex\Desktop\Current classes\CSE 3300\HW\PA1>
```

7. See if it correctly sends something if no words are found:

   This was tested in a way to see extreme cases if something queried by the client is just not able to found, resulting in the server just returning "no words found"



```
Input word with '*' in the middle:  tdsfdsf*
From Server: No words found


Input word with '*' in the middle:  ddee*
From Server: No words found


Input word with '*' in the middle:  de*dsdg
From Server: No words found


Input word with '*' in the middle:
```