

STUDENT PORTFOLIO



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Semester: VI

Subject Title: I8CSC304J COMPILER DESIGN

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Assignment – Work Sheet (Unit I, 2, 3, 4, & 5)
(Write about the assignment questions and how you solved differently)

$S \rightarrow NP VP$
 $NP \rightarrow \underline{DT} N / NP PP$
 $PP \rightarrow PRP NP$
 $VP \rightarrow V NP / V PP$
 $DT \rightarrow a / the$
 $N \rightarrow lion / deer / tree$
 $PRP \rightarrow under / with / above$
 $V \rightarrow ate / saw / saw$

FIRST() -

$S = \{ a, the \}$
 $NP = \{ a, the \}$
 $PP = \{ under, with, above \}$
 $VP = \{ ate, saw, saw \}$
 $DT = \{ a, the \}$
 $N = \{ lion, deer, tree \}$
 $PRP = \{ under, with, above \}$
 $V = \{ ate, saw, saw \}$

FOLLOW() -

$S = \{ \$ \}$
 $VP = \{ ate, saw, saw, under, with, above, follow(VP), follow(PP) \}$
 $P = \{ ate, saw, saw, under, with, above, \$ \}$

$$fP = \{ \text{follow}(NP), \text{follow}(VP) \}$$

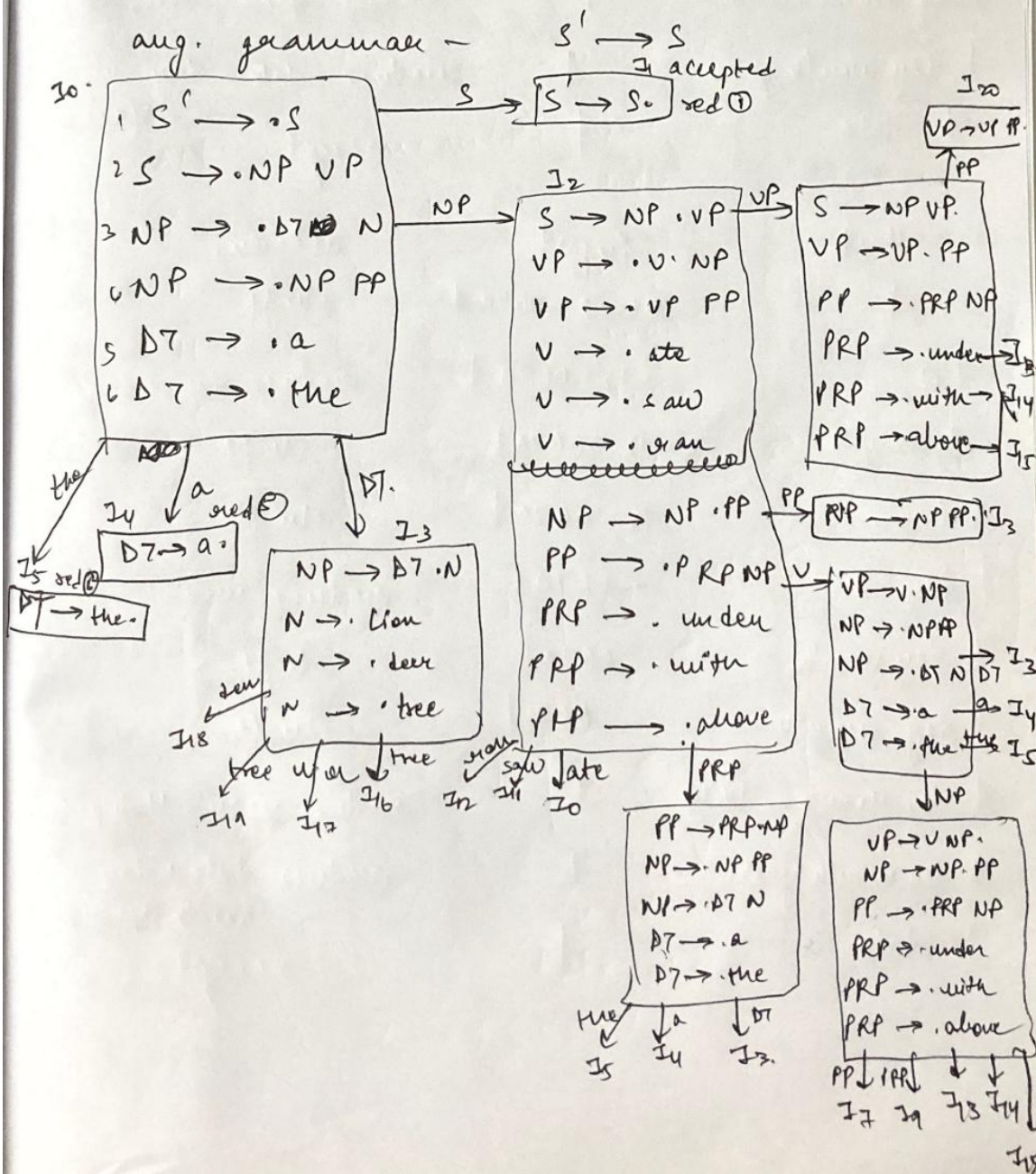
= { ate, saw, ran, under, with, above, }

$$V = \{ \$, \text{under}, \text{with}, \text{above} \}$$

$D7 = \{ \text{lion, deer, tree} \}$

$$N = \{ \text{follow}(NP) \}$$

N^o { ate, saw, man, under, with sleeve, \$ }

$$PRP = \{ \text{the } a \}$$
$$V = \{ a, the \}.$$


| stack | Input string | action |
|-----------------------------|---------------------------------------|------------|
| \$ 0. | A lion ate the deer under the tree \$ | shift a |
| \$ 0 A4 | lion ate the deer under the tree \$ | A → DT |
| \$ 0 DT3 | lion ate the deer under the tree \$ | shift lion |
| \$ 0 DT3 lion 17 | lion ate the deer under the tree \$ | N → lion |
| \$ 0 DT3 N16 | ate the deer under the tree \$ | NP → DT N |
| \$ 0 NP2 | ate the deer under the tree \$ | shift ate |
| \$ 0 NP2 ate 10 | the deer under the tree \$ | V → ate |
| \$ 0 NP2 V8 | the deer under the tree \$ | DT → the |
| \$ 0 NP2 V8 the 5 | the deer under the tree \$ | shift deer |
| \$ 0 NP2 V8 DT3 | deer under the tree \$ | N → deer |
| \$ 0 NP2 V8 DT3 deer 18. | under the tree \$ | NP → DT N |
| \$ 0 NP2 V8 DT3 N16 | under the tree \$ | VP → V NP |
| \$ 0 NP2 V8 NP24 | under the tree \$ | PP → under |
| \$ 0 NP2 VP6 under 13 | the tree \$ | shift the |
| \$ 0 NP2 VP6 PP9 | . tree \$ | DT → the |
| DT3 the the 5 | tree \$ | shift tree |
| \$ 0 NP2 VP6 PP9 DT3 | tree \$ | NP → DT N |
| \$ 0 NP2 VP6 PP9 DT3 N16 | \$ | NP → PP NP |
| \$ 0 NP2 VP6 PP9 NP | \$ | VP → VP PP |
| \$ 0 NP2 VP6 PP | \$ | S → NP VP |
| \$ 0 NP2 VP | \$ | |
| \$ 0 S | \$ | |
| \$ 1 | \$ | accept |

| | a | the | lion | deer | tree | under | above | with | ate | saw | ran | f | s | VP | NP | PP | PRP | DT | N | V |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---|----|----|----|-----|----|----|---|
| I ₀ | s ₄ | s ₅ | | | | | | | | | | | 1 | | 2 | | | 3 | | |
| I ₁ | | | | | | | | | | | | accept | | | | | | | | |
| I ₂ | | | | | | s ₁₃ | s ₁₅ | s ₁₄ | s ₁₀ | s ₁₁ | s ₁₂ | | | 6 | | 7 | 9 | | | 8 |
| I ₃ | | | s ₁₇ | s ₁₈ | s ₁₉ | | | | | | | | | | | | | | 16 | |
| I ₄ | | | s ₂₇ | s ₂₇ | s ₂₇ | | | | | | | | | | | | | | | |
| I ₅ | | | s ₂₈ | s ₂₈ | s ₂₈ | | | | | | | | | | | | | | | |
| I ₆ | | | | | | s ₁₃ | s ₁₅ | s ₁₄ | | | | s ₁ | | | | 20 | 9 | | | |
| I ₇ | | | | | | s ₁₃ | s ₁₃ | s ₁₃ | s ₁₃ | s ₁₃ | s ₁₃ | s ₁₃ | | | | | | | | |
| I ₈ | s ₄ | s ₅ | | | | | | | | | | | | | 21 | | | 3 | | |
| I ₉ | s ₄ | s ₅ | | | | | | | | | | | | | 22 | | | 3 | | |
| I ₁₀ | s ₅ | s ₅ | | | | | | | | | | | | | | | | | | |
| I ₁₁ | s ₁₆ | s ₁₆ | | | | | | | | | | | | | | | | | | |
| I ₁₂ | s ₁₇ | s ₁₇ | | | | | | | | | | | | | | | | | | |
| I ₁₃ | s ₁₂ | s ₁₂ | | | | | | | | | | | | | | | | | | |
| I ₁₄ | s ₁₃ | s ₁₃ | | | | | | | | | | | | | | | | | | |
| I ₁₅ | s ₁₄ | s ₁₄ | | | | | | | | | | | | | | | | | | |
| I ₁₆ | | | | | | s ₂ | s ₂ | s ₂ | s ₂ | s ₂ | s ₂ | s ₂ | | | | | | | | |
| I ₁₇ | | | | | | s ₉ | s ₉ | s ₉ | s ₉ | s ₉ | s ₉ | s ₉ | | | | | | | | |
| I ₁₈ | | | | | | s ₁₀ | s ₁₀ | s ₁₀ | s ₁₀ | s ₁₀ | s ₁₀ | s ₁₀ | | | | | | | | |
| I ₁₉ | | | | | | s ₁₁ | s ₁₁ | s ₁₁ | s ₁₁ | s ₁₁ | s ₁₁ | s ₁₁ | | | | | | | | |
| I ₂₀ | | | | | | s ₆ | s ₆ | s ₆ | | | | s ₆ | | | | | | | | |
| I ₂₁ | | | | | | s ₃ | s ₁₅ | s ₁₄ | | | | | | | | 7 | 9 | | | |
| I ₂₂ | | | | | | s ₃ | s ₁₅ | s ₁₄ | | | | | | | | 7 | 9 | | | |

2). stack

| | Input | action |
|---------------------|--------------|----------------------------------|
| \$ | 24-08-1752\$ | shift |
| \$24 | -08-1752\$ | reduce day = 2 digit |
| \$ day | -08-1752\$ | shift |
| \$ day - | 08-1752\$ | shift 08 |
| \$ day - 08 | -1752\$ | reduce month = 0 digit |
| \$ day month | -1752\$ | shift - |
| \$ day month - | 1752\$ | shift 1752 |
| \$ day month - 1752 | \$ | reduce year = 4 digits |
| \$ day month year | \$ | reduce date = day - month - year |
| \$ date | \$ | accept |

| Stack | Input | action |
|---------------------|--------------|------------------------------|
| \$ | 01-12-0679\$ | shift |
| \$01 | -12-0679\$ | reduce day = 0 digit |
| \$ (day) | -12-0679\$ | shift |
| \$ day - | 12-0679\$ | shift |
| \$ day - 12 | -0679\$ | reduce month = 2 digit |
| \$ day month | -0679\$ | shift |
| \$ day month - | 0679\$ | shift |
| \$ day month - 0679 | \$ | reduce year = 4 digit |
| \$ day month year | \$ | reduce date = day month year |
| \$ date | \$ | accept |

3)

$S \rightarrow \text{Age Qual}$

$\text{Age} \rightarrow \text{digit digit}$

$\text{Age} \rightarrow \text{digit digit digit}$

$\text{digit} \rightarrow 1/2/3/4/5/6/7/8/9$

$\text{Qual} \rightarrow \epsilon$

$\text{Qual} \rightarrow \text{ug}$

$\text{Qual} \rightarrow \text{pg}$

$\text{Qual} \rightarrow \text{dip}$

| | digit | ug | pg | dip | \$ |
|------|------------------------------------|---------------------------------|---------------------------------|---------------------------------|----|
| S | $S \rightarrow \text{Age Qual}$ | $S \rightarrow \text{age qual}$ | $S \rightarrow \text{Age qual}$ | $S \rightarrow \text{age qual}$ | |
| Age | $A \rightarrow \text{digit digit}$ | | | | |
| Qual | | $Q \rightarrow \text{ug}$ | $Q \rightarrow \text{pg}$ | $Q \rightarrow \text{dip}$ | |

input - 61 pg

| stack | input | Action |
|-------------|----------|---|
| \$ S | 61 pg \$ | $S \rightarrow \text{Age Qual}$ |
| Age Qual \$ | 61 pg \$ | $\text{Age} \rightarrow \text{digit digit}$ |
| 61 Qual \$ | 61 pg \$ | pop 61 |
| Qual \$ | pg \$ | $\text{Qual} \rightarrow \text{pg}$ |
| pg \$ | pg \$ | pop pg |
| \$ | \$ | accept |

| |
|---|
| |
| <p>Assignment (what is the most interesting part in the assignment)</p> <p>The questions were challenging and brainstorming. Really helped gain more knowledge about the subject</p> |
| <p>Hacker Rank Achievements</p> |



Regex

Points: 655 Rank: 3905

Matching Specific String

Easy, Max Score: 5, Success Rate: 96.10%



Solved



STATUS

☒ Solved☐ Unsolved

DIFFICULTY

☐ Easy☐ Medium☐ Hard

SUBDOMAINS

☐ Introduction☐ Character Class☐ Repetitions

Matching Anything But a Newline

Easy, Max Score: 5, Success Rate: 83.70%



Solved



Matching Digits & Non-Digit Characters

Easy, Max Score: 5, Success Rate: 97.34%



Solved



Matching Word & Non-Word Character

Easy, Max Score: 5, Success Rate: 98.72%



Solved



Matching Start & End

Easy, Max Score: 5, Success Rate: 97.63%



Solved



Matching Specific Characters

Easy, Max Score: 10, Success Rate: 96.39%



Solved



Excluding Specific Characters

Easy, Max Score: 10, Success Rate: 97.91%



Solved



Matching Character Ranges

<https://www.hackerrank.com/challenges/excluding-specific-characters?isFull>

Solved



Matching Character Ranges

Easy, Max Score: 10, Success Rate: 96.37%



Solved



Matching {x} Repetitions

Easy, Max Score: 20, Success Rate: 95.69%



Solved



Matching {x, y} Repetitions

Easy, Max Score: 20, Success Rate: 97.87%



Solved



Matching Zero Or More Repetitions

Easy, Max Score: 20, Success Rate: 98.97%



Solved



Matching One Or More Repetitions

Easy, Max Score: 20, Success Rate: 99.45%



Solved

<https://www.hackerrank.com/challenges/matching-zero-or-more-repetitions?isFullScreen=true>

Matching Ending Items

Easy, Max Score: 20, Success Rate: 97.30%

★

Solved

Matching Word Boundaries

Easy, Max Score: 20, Success Rate: 96.95%

★

Solved

Capturing & Non-Capturing Groups

Easy, Max Score: 20, Success Rate: 98.97%

★

Solved

Alternative Matching

Easy, Max Score: 20, Success Rate: 94.20%

★

Solved

Matching Same Text Again & Again

Easy, Max Score: 20, Success Rate: 97.89%

★

Solved

https://www.hackerrank.com/challenges/alternative-matching?isFullScreen=L...

Backreferences To Failed Groups

Easy, Max Score: 20, Success Rate: 94.69%

★

Solved

Branch Reset Groups

Easy, Max Score: 20, Success Rate: 95.23%

★

Solved

Forward References

Easy, Max Score: 20, Success Rate: 89.55%

★

Solved

Positive Lookahead

Easy, Max Score: 20, Success Rate: 99.41%

★

Solved

Negative Lookahead

Easy, Max Score: 20, Success Rate: 97.09%

★

Solved

https://www.hackerrank.com/challenges/positive-lookahead?isFullScreen=true

Detect HTML links

Medium, Max Score: 10, Success Rate: 74.27%

★

Solved

Detect HTML Tags

Easy, Max Score: 10, Success Rate: 93.52%

★

Solved

Find A Sub-Word

Easy, Max Score: 10, Success Rate: 90.71%

★

Solved

Alien Username

Easy, Max Score: 10, Success Rate: 95.46%

★

Solved

IP Address Validation

Easy, Max Score: 10, Success Rate: 91.65%

★

Solved

https://www.hackerrank.com/challenges/alien-username?isFullScreen=true

STATUS

☒ Solved

☐ Unsolved

DIFFICULTY

☐ Easy

☐ Medium

☐ Hard

SUBDOMAINS

☐ Introduction

☐ Character Class

☐ Repetitions

☐ Grouping and Capturing

☐ Backreferences

☐ Assertions

☐ Applications

Find a Word

Medium, Max Score: 15, Success Rate: 88.42%

★

Solved

Detect the Email Addresses

Medium, Max Score: 15, Success Rate: 89.19%

★

Solved

Detect the Domain Name

Medium, Max Score: 15, Success Rate: 90.52%

★

Solved

Building a Smart IDE: Identifying comments

Medium, Max Score: 20, Success Rate: 87.59%

★

Solved

Detecting Valid Latitude and Longitude Pairs

Easy, Max Score: 20, Success Rate: 95.56%

★

Solved

STATUS

☒ Solved

☐ Unsolved

DIFFICULTY

☐ Easy

☐ Medium

☐ Hard

SUBDOMAINS

☐ Introduction

☐ Character Class

☐ Repetitions

☐ Grouping and Capturing

☐ Backreferences

☐ Assertions

☐ Applications

https://www.hackerrank.com/challenges/de-identifying-comments?isFullScreen=true

HackerRank Tweets

Easy, Max Score: 15, Success Rate: 97.35%

★

Solved

Build a Stack Exchange Scraper

Easy, Max Score: 15, Success Rate: 95.80%

★

Solved

Utopian Identification Number

Easy, Max Score: 15, Success Rate: 97.15%

★

Solved

Valid PAN format

Easy, Max Score: 15, Success Rate: 93.69%

★

Solved

Find HackerRank

Easy, Max Score: 15, Success Rate: 97.09%

★

Solved

STATUS

☒ Solved

☐ Unsolved

DIFFICULTY

☐ Easy

☐ Medium

☐ Hard

SUBDOMAINS

☐ Introduction

☐ Character Class

☐ Repetitions

☐ Grouping and Capturing

☐ Backreferences

☐ Assertions

☐ Applications

https://www.hackerrank.com/challenges/de-identifying-comments?isFullScreen=true

Saying Hi

Easy, Max Score: 15, Success Rate: 96.96%

★

Solved

HackerRank Language

Easy, Max Score: 15, Success Rate: 92.82%

★

Solved

Building a Smart IDE: Programming Language Detection

Medium, Max Score: 30, Success Rate: 82.59%

★

Solved

Split the Phone Numbers

Easy, Max Score: 15, Success Rate: 98.08%

★

Solved

Detect HTML Attributes

Easy, Max Score: 20, Success Rate: 94.34%

★

Solved

STATUS

☒ Solved

☐ Unsolved

DIFFICULTY

☐ Easy

☐ Medium

☐ Hard

SUBDOMAINS

☐ Introduction

☐ Character Class

☐ Repetitions

☐ Grouping and Capturing

☐ Backreferences

☐ Assertions

☐ Applications

https://www.hackerrank.com/challenges/programming-language-detection?isFullScreen=true

Building a Smart IDE: Programming Language Detection

Medium, Max Score: 30, Success Rate: 82.59%

★ Solved

- ☒ Solved
☐ Unsolved

Split the Phone Numbers

Easy, Max Score: 15, Success Rate: 98.08%

★ Solved

- DIFFICULTY
☐ Easy
☐ Medium
☐ Hard

Detect HTML Attributes

Easy, Max Score: 20, Success Rate: 94.34%

★ Solved

- SUBDOMAINS
☐ Introduction
☐ Character Class
☐ Repetitions
☐ Grouping and Capturing
☐ Backreferences
☐ Assertions
☐ Applications

UK and US: Part 2

Easy, Max Score: 10, Success Rate: 91.53%

★ Solved

Prepare

Bookmarked Challenges

Your Preparation

PREPARE BY TOPICS

Regex

94% (44/47 challenges solved)

Continue Preparation

PREPARE BY TOPICS

Problem Solving

33% Get to 30 points to unlock this badge

Continue Preparation

Problem Solving

PREPARE BY TOPICS

Python
★★

PREPARE BY TOPICS

C++
CPP
★★



Signature



Note: Enclose the assignment and relevant certificates along with the profile