

In [2]:

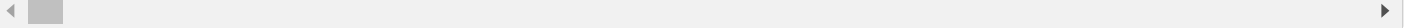


```
import nltk
import numpy
from nltk.tokenize import sent_tokenize
```

In [3]:



```
#Text : SRS
sentence = "In most cases, requirement analysis is performed to determine the system functi
```



In [4]:



```
punctuations="?:'!..,;)(a/s'A 's"
sentence_words = nltk.word_tokenize(sentence)
for word in sentence_words:
    if word in punctuations:
        sentence_words.remove(word)
ignore_stopwords=True
print('(sentence):',sentence_words)
```

```
(sentence): ['In', 'most', 'cases', 'requirement', 'analysis', 'is', 'perfor
med', 'to', 'determine', 'the', 'system', 'function', 'and', 'user', 'interf
ace', 'It', 'enables', 'users', 'to', 'comprehend', 'system', 'functionalit
y', 'and', 'developers', 'to', 'understand', 'the', 'system', 'requirement
s', 'The', 'requirements', 'analysis', 'principal', 'task', 'is', 'to', 'ide
ntify', 'system', 'use', 'cases', 'diagram', 'and', 'create', 'system', 'req
uirements', 'model', 'The', 'use', 'of', 'case', 'diagram', 'state', 'machin
e', 'diagram', 'and', 'sequence', 'diagram', 'are', 'the', 'major', 'outcome
s', 'Requirements', 'analysis', 'phase', 'First', 'we', 'are', 'analysing',
'and', 'refine', 'the', 'requirements', 'of', 'the', 'system', 'In', 'additi
on', 'Listing', 'the', 'involved', 'operators', 'in', 'the', 'system', 'an
d', 'identify', 'all', 'the', 'use', 'cases', 'and', 'roles', 'to', 'describ
e', 'And', 'then', 'to', 'analyse', 'the', 'relationship', 'between', 'the',
'roles', 'and', 'the', 'cases', 'and', 'use', 'UML', 'modelling', 'tool', 't
o', 'draw', 'the', 'case', 'diagram', 'System', 'analysis', 'and', 'design',
'phase', 'Identify', 'all', 'the', 'needs', 'of', 'the', 'system', 'Abstrac
t', 'the', 'classes', 'from', 'the', 'actual', 'needs', 'and', 'describe',
'the', 'relationship', 'between', 'these', 'classes', 'Extracting', 'our',
'attributes', 'actors', 'and', 'classes', 'from', 'analysing', 'our', 'tex
t', 'in', 'the', 'Natural', 'Language', 'Processing', 'with', 'Python', 'NL
P', 'using', 'NLTK', 'library', 'Phase', 'of', 'system', 'implementation',
'The', 'model', 'in', 'the', 'first', 'two', 'phases', 'is', 'actually', 'cr
eated', 'in', 'system', 'logic', 'aspect', 'This', 'phase', 'is', 'to', 'acc
omplish', 'the', 'physical', 'realization', 'of', 'the', 'system', 'such',
'as', 'main', 'classes', 'operators', 'or', 'associations', 'and', 'attribut
es', 'The', 'library', 'information', 'management', 'system', 'is', 'an', 'e
lectronic', 'archives', 'management', 'system', 'that', 'processes', 'larg
e', 'number', 'of', 'book', 'information', 'using', 'computer', 'The', 'need
s', 'of', 'three', 'sorts', 'of', 'users', 'must', 'be', 'met', 'by', 'thi
s', 'system', 'member', 'librarians', 'author', 'and', 'library', 'to', 'che
ck', 'for', 'another', 'branch', 'if', 'found', 'Many', 'individuals', 'ca
n', 'be', 'categorized', 'as', 'user', 'or', 'librarian', 'based', 'on', 'th
eir', 'status', 'and', 'only', 'one', 'person', 'serves', 'as', 'the', 'syst
em', 'administrator', 'The', 'readers', 'behaviour', 'is', 'to', 'query', 't
he', 'personal', 'information', 'to', 'query', 'the', 'books', 'to', 'book',
'borrow', 'and', 'return', 'them', 'In', 'case', 'of', 'the', 'due', 'date',
'of', 'borrowing', 'book', 'has', 'passed', 'the', 'member', 'will', 'be',
'obliged', 'to', 'pay', 'fine', 'A', 'library', 'database', 'must', 'store',
'information', 'about', 'its', 'members', 'librarian', 'and', 'the', 'rack',
'number', 'of', 'the', 'book', 'where', 'it', 'can', 'be', 'found', 'Each',
'book', 'item', 'status', 'descriptive', 'attributes', 'and', 'cost', 'for',
'losses', 'and', 'late', 'returns', 'must', 'be', 'tracked', 'by', 'the', 'l
ibrary/librarian', 'The', 'ISBN', 'of', 'books', 'will', 'be', 'used', 'to',
'identify', 'them', 'Each', 'book', 'will', 'have', 'unique', 'ISBN', 'in',
'order', 'to', 'allow', 'multiple', 'copies', 'of', 'the', 'same', 'book',
'For', 'the', 'users', 'to', 'be', 'member', 'they', 'need', 'to', 'apply',
'for', 'library', 'card', 'where', 'details', 'about', 'the', 'member', 'ca
n', 'identified', 'card', 'number', 'barcode', 'issue', 'date', 'and', 'acti
ve', 'status', 'Furthermore', 'when', 'applying', 'for', 'library', 'card',
'members', 'must', 'create', 'an', 'account', 'then', 'they', 'will', 'be',
```

'given', 'unique', 'ID', 'their', 'names', 'and', 'password', 'that', 'can', 'be', 'reset', 'later', 'after', 'account', 'activation', 'by', 'librarian', 'In', 'addition', 'library', 'card', 'will', 'be', 'required', 'for', 'check out', 'operations', 'The', 'library', 'card', 'will', 'have', 'its', 'own', 'fines', 'but', 'any', 'outstanding', 'fines', 'on', 'member', 's', 'cards', 'will', 'prevent', 'them', 'from', 'using', 'the', 'library', 'services', 'The', 'system', 'primary', 'users', 'are', 'librarians', 'They', 'are', 'in', 'charge', 'of', 'day-to-day', 'management', 'and', 'service', 'operations', 'such', 'as', 'book', 'ordering', 'new', 'book', 'verification', 'book', 'registration', 'borrow', 'and', 'return', 'books', 'from', 'members', 'and', 'so', 'on', 'The', 'librarians', 'are', 'also', 'in', 'charge', 'of', 'all', 'issues', 'concerning', 'books', 'including', 'book', 'status', 'borrowed', 'not', 'found', 'and', 'etc', 'library', 'management', 'to', 'check', 'if', 'the', 'book', 'can', 'be', 'found', 'in', 'another', 'branch', 'The', 'key', 'point', 'among', 'them', 'is', 'system', 'maintenance', 'which', 'includes', 'the', 'maintenance', 'of', 'member', 'rights', 'and', 'account', 'details', 'the', 'creation', 'and', 'activation/deactivation', 'of', 'members', 'account', 'fine', 'payment', 'and', 'so', 'on', 'For', 'further', 'elaboration', 'check', 'our', 'Library', 'Management', 'System', 'Librarian', 'state', 'machine', 'diagram', '-', 'This', 'diagram', 'depicts', 'the', 'activities', 'and', 'scenarios', 'that', 'occur', 'when', 'member', 'checks', 'out', 'book', 'The', 'actions', 'and', 'decisions', 'were', 'all', 'highlighted', 'in', 'the', 'state', 'machine', 'diagram', 'see', 'figure', '2', 'While', 'designing', 'our', 'Library', 'Management', 'System', 'we', 'will', 'concentrate', 'on', 'the', 'following', 'requirements', 'Books', 'should', 'be', 'searchable', 'by', 'title', 'author', 'subject', 'category', 'and', 'publication', 'date', 'for', 'any', 'library', 'member', 'Each', 'book', 'will', 'have', 'unique', 'identification', 'number', 'as', 'well', 'as', 'other', 'details', 'such', 'as', 'rack', 'number', 'that', 'will', 'aid', 'in', 'physically', 'locating', 'the', 'book', 'A', 'book', 'might', 'have', 'multiple', 'copies', 'and', 'library', 'users', 'should', 'be', 'able', 'to', 'borrow', 'and', 'reserve', 'any', 'of', 'them', 'Each', 'copy', 'of', 'book', 'will', 'be', 'referred', 'to', 'as', 'book', 'item', 'The', 'system', 'should', 'be', 'able', 'to', 'retrieve', 'information', 'such', 'as', 'who', 'took', 'specific', 'book', 'or', 'what', 'books', 'are', 'checked', 'out', 'by', 'specific', 'library', 'member', 'There', 'should', 'be', 'maximum', 'limit', 'of', '5', 'books', 'that', 'member', 'can', 'check', 'out', 'A', 'member', 'should', 'be', 'allowed', 'to', 'keep', 'book', 'for', 'maximum', 'of', '10', 'days', 'For', 'books', 'returned', 'after', 'the', 'due', 'date', 'the', 'user/customer', 'must', 'pay', 'fine', 'Members', 'should', 'be', 'able', 'to', 'reserve', 'books', 'that', 'are', 'currently', 'unavailable', 'The', 'system', 'should', 'be', 'able', 'to', 'send', 'notifications', 'when', 'reserved', 'books', 'become', 'available', 'as', 'well', 'as', 'when', 'the', 'book', 'is', 'not', 'returned', 'by', 'the', 'due', 'date', 'Each', 'book', 'and', 'member', 'will', 'have', 'their', 'own', 'barcode', 'The', 'system', 'will', 'be', 'able', 'to', 'read', 'barcodes', 'from', 'books', 'as', 'well', 'as', 'library', 'cards', 'from', 'members', 'In', 'our', 'system', 'there', 'are', 'three', 'main', 'actors', 'Librarians', 'are', 'primarily', 'in', 'charge', 'of', 'adding', 'and', 'modifying', 'books', 'book', 'items', 'and', 'users', 'In', 'addition', 'the', 'Librarian', 'can', 'issue', 'reserve', 'and', 'return', 'book', 'items', 'Member', 'All', 'members', 'have', 'access', 'to', 'the', 'catalogue', 'and', 'can', 'check', 'out', 'reserve', 'renew', 'and', 'return', 'books', 'System', 'Is', 'primarily', 'in', 'charge', 'of', 'sending', 'notifications', 'for', 'overdue', 'books', 'cancelled', 'reservations', 'and', 'so', 'on', 'Our', 'Library', 'Management', 'System', 'is', 'divided', 'into', 'the', 'following', 'classes', 'Library', 'The', 'heart', 'of', 'the', 'organization', 'for', 'which', 'this', 'software', 'was', 'created', 'It', 'has', 'attributes', 'such', 'as', "Name", 'to', 'differentiate', 'it', 'from', 'other', 'libraries', 'and', "Address", 'to', 'describe', 'its', 'location', 'the', 'class', 'should', 'be', 'able', 'to', 'identify', 'in', 'which', 'branch', 'is', 'the', 'book', 'loc

ated', 'Book', 'The', 'system', 'fundamental', 'building', 'block', 'Every',
'book', 'will', 'have', 'an', 'ISBN', 'title', 'and', 'subject', 'Book', 'It
em', 'Any', 'book', 'can', 'have', 'multiple', 'copies', 'and', 'each', 'cop
y', 'is', 'treated', 'as', 'book', 'item', 'in', 'our', 'system', 'Each', 'b
ook', 'will', 'have', 'its', 'own', 'barcode', 'In', 'addition', 'giving',
'information', 'if', 'the', 'book', 'is', 'borrowed', 'and', 'when', 'it',
'should', 'be', 'returned', 'by', 'the', 'members', 'user', 'Information',
'also', 'about', 'the', 'publication', 'date', 'of', 'the', 'book', 'and',
'date', 'of', 'purchase', 'if', 'the', 'member', 'bought', 'it', 'As', 'an',
'operation', 'process', 'librarian', 'should', 'be', 'able', 'to', 'check',
'out', 'the', 'book', 'Account', 'There', 'will', 'be', 'two', 'types', 'o
f', 'accounts', 'in', 'the', 'system', 'one', 'for', 'general', 'members',
'and', 'one', 'for', 'librarians', 'where', 'every', 'class', 'will', 'hav
e', 'its', 'own', 'id', 'password', 'and', 'username', 'Member', 'or', 'libr
arian', 'should', 'be', 'able', 'to', 'reset', 'their', 'passwords', 'Librar
y', 'Card', 'A', 'library', 'card', 'will', 'be', 'issued', 'to', 'each', 'l
ibrary', 'user', 'which', 'will', 'be', 'used', 'to', 'identify', 'users',
'when', 'issuing', 'or', 'returning', 'books', 'Where', 'there', 'will', 'b
e', 'unidirectional', 'association', 'with', 'the', 'Account', 'details', 'A
dditionally', 'it', 'should', 'hold', 'information', 'like', 'card', 'numbe
r', 'barcode', 'issue', 'date', 'and', 'account', 'status', 'Book', 'Reserva
tion', 'In', 'charge', 'of', 'managing', 'reservations', 'for', 'book', 'ite
ms', 'based', 'on', 'the', 'creation', 'date', 'and', 'status', 'If', 'the',
'account', 'is', 'active', 'book', 'reservation', 'can', 'be', 'confirmed',
'Book', 'Lending', 'Manage', 'the', 'loaning', 'of', 'books', 'Due', 'date',
'&', 'return', 'date', 'should', 'be', 'known', 'Catalogue', 'A', 'list', 'o
f', 'books', 'sorted', 'according', 'to', 'certain', 'criteria', 'Our', 'sys
tem', 'will', 'allow', 'you', 'to', 'search', 'four', 'catalogues', 'by', 't
itle', 'author', 'subject', 'and', 'publish', 'date', 'Fines', 'in', 'case',
'the', 'lend', 'book', 'is', 'not', 'returned', 'by', 'the', 'due', 'date',
'specified', 'in', 'the', 'Book', 'Lending', 'class', 'This', 'class', 'wil
l', 'be', 'in', 'charge', 'of', 'calculating', 'and', 'collecting', 'fines',
'from', 'library', 'patrons', 'Bill', 'this', 'class', 'will', 'be', 'referr
ed', 'from', 'the', 'transaction', 'to', 'be', 'paid', 'by', 'the', 'membe
r', 'And', 'librarian', 'will', 'be', 'able', 'to', 'create', 'issue', 'an
d', 'update', 'bill', 'Author', 'This', 'class', 'will', 'focus', 'on', 'th
e', 'author', 'of', 'book', ' ', 'storing', 'name', 'of', 'the', 'book', 'an
d', 'brief', 'description', ' ', 'Rack', 'Books', 'will', 'be', 'arranged',
'on', 'shelves', ' ', 'Each', 'rack', 'will', 'be', 'identified', 'by', 'a',
'rack', 'number', 'and', 'a', 'location', 'identifier', 'that', 'describes',
'the', 'rack', 'physical', 'location', 'in', 'the', 'library', ' ', 'Notific
ation', 'This', 'class', 'will', 'handle', 'sending', 'notifications', 'to',
'library', 'users', 'to', 'their', 'email', 'addresses', ' ']

#POS Tagging

```

tagged = nltk.pos_tag(sentence_words)
#IN    preposition
#CD    cardinal digit
#NN    noun, singular (cat, tree)
#NNP   proper noun, singular (sarah)
#BD    verb past tense (pleaded)
#RB    adverb (occasionally, swiftly)
#VB    verb (ask)
#JJ    This NLTK POS Tag is an adjective (large)
print('tagged: ',tagged)

```

```

tagged: [('In', 'IN'), ('most', 'JJ'), ('cases', 'NNS'), ('requiremen
t', 'JJ'), ('analysis', 'NN'), ('is', 'VBZ'), ('performed', 'VBN'), ('to',
'TO'), ('determine', 'VB'), ('the', 'DT'), ('system', 'NN'), ('function',
'NN'), ('and', 'CC'), ('user', 'JJ'), ('interface', 'NN'), ('It', 'PRP'),
('enables', 'VBZ'), ('users', 'NNS'), ('to', 'TO'), ('comprehend', 'VB'),
('system', 'NN'), ('functionality', 'NN'), ('and', 'CC'), ('developers',
'NNS'), ('to', 'TO'), ('understand', 'VB'), ('the', 'DT'), ('system', 'N
N'), ('requirements', 'NNS'), ('The', 'DT'), ('requirements', 'NNS'), ('an
alysis', 'NN'), ('principal', 'JJ'), ('task', 'NN'), ('is', 'VBZ'), ('to',
'TO'), ('identify', 'VB'), ('system', 'NN'), ('use', 'NN'), ('cases', 'NN
S'), ('diagram', 'VBP'), ('and', 'CC'), ('create', 'VBP'), ('system', 'N
N'), ('requirements', 'NNS'), ('model', 'VBP'), ('The', 'DT'), ('use', 'N
N'), ('of', 'IN'), ('case', 'NN'), ('diagram', 'NN'), ('state', 'NN'), ('m
achine', 'NN'), ('diagram', 'NN'), ('and', 'CC'), ('sequence', 'NN'), ('di
agram', 'NN'), ('are', 'VBP'), ('the', 'DT'), ('major', 'JJ'), ('outcome
s', 'NNS'), ('Requirements', 'NNPS'), ('analysis', 'NN'), ('phase', 'NN'),
('First', 'NNP'), ('we', 'PRP'), ('are', 'VBP'), ('analysing', 'VBG'), ('a
nd', 'CC'), ('refine', 'VB'), ('the', 'DT'), ('requirements', 'NNS'), ('o
f', 'IN'), ('the', 'DT'), ('system', 'NN'), ('In', 'IN'), ('addition', 'N
N'), ('Listing', 'VBG'), ('the', 'DT'), ('involved', 'JJ'), ('operators',
'NNS'), ('in', 'IN'), ('the', 'DT'), ('system', 'NN'), ('and', 'CC'), ('id
entify', 'VB'), ('all', 'PDT'), ('the', 'DT'), ('use', 'NN'), ('cases', 'N
NS'), ('and', 'CC'), ('roles', 'NNS'), ('to', 'TO'), ('describe', 'VB'),
('And', 'CC'), ('then', 'RB'), ('to', 'TO'), ('analyse', 'VB'), ('the', 'D
T'), ('relationship', 'NN'), ('between', 'IN'), ('the', 'DT'), ('roles',
'NNS'), ('and', 'CC'), ('the', 'DT'), ('cases', 'NNS'), ('and', 'CC'), ('u
se', 'VB'), ('UML', 'NNP'), ('modelling', 'VBG'), ('tool', 'NN'), ('to',
'TO'), ('draw', 'VB'), ('the', 'DT'), ('case', 'NN'), ('diagram', 'NN'),
('System', 'NNP'), ('analysis', 'NN'), ('and', 'CC'), ('design', 'NN'),
('phase', 'NN'), ('Identify', 'NNP'), ('all', 'PDT'), ('the', 'DT'), ('nee
ds', 'NNS'), ('of', 'IN'), ('the', 'DT'), ('system', 'NN'), ('Abstract',
'NNP'), ('the', 'DT'), ('classes', 'NNS'), ('from', 'IN'), ('the', 'DT'),
('actual', 'JJ'), ('needs', 'NNS'), ('and', 'CC'), ('describe', 'VB'), ('t
he', 'DT'), ('relationship', 'NN'), ('between', 'IN'), ('these', 'DT'),
('classes', 'NNS'), ('Extracting', 'VBG'), ('our', 'PRP$'), ('attributes',
'NNS'), ('actors', 'NNS'), ('and', 'CC'), ('classes', 'NNS'), ('from', 'I
N'), ('analysing', 'VBG'), ('our', 'PRP$'), ('text', 'NN'), ('in', 'IN'),
('the', 'DT'), ('Natural', 'NNP'), ('Language', 'NNP'), ('Processing', 'VB
G'), ('with', 'IN'), ('Python', 'NNP'), ('NLP', 'NNP'), ('using', 'VBG'),
('NLTK', 'NNP'), ('library', 'JJ'), ('Phase', 'NNP'), ('of', 'IN'), ('syst
em', 'NN'), ('implementation', 'NN'), ('The', 'DT'), ('model', 'NN'), ('i
n', 'IN'), ('the', 'DT'), ('first', 'JJ'), ('two', 'CD'), ('phases', 'NN
S'), ('is', 'VBZ'), ('actually', 'RB'), ('created', 'VBN'), ('in', 'IN'),
('system', 'NN'), ('logic', 'JJ'), ('aspect', 'NN'), ('This', 'DT'), ('pha

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In [6]:



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actors/NNS
and/CC
classes/NNS
from/IN
analysing/VBG
our/PRP\$
text/NN
in/IN
the/DT
(ORGANIZATION Natural/NNP)
Language/NNP
Processing/VBG
with/IN
(PERSON Python/NNP NLP/NNP)
using/VBG
(ORGANIZATION NLTK/NNP)
library/JJ
Phase/NNP
of/IN
system/NN
implementation/NN
The/DT
model/NN
in/IN
the/DT
first/JJ
two/CD
phases/NNS
is/VBZ
actually/RB
created/VBN

in/IN
system/NN
logic/JJ
aspect/NN
This/DT
phase/NN
is/VBZ
to/TO
accomplish/VB
the/DT
physical/JJ
realization/NN
of/IN
the/DT
system/NN
such/JJ
as/IN
main/JJ
classes/NNS
operators/NNS
or/CC
associations/NNS
and/CC
attributes/VBZ
The/DT
library/JJ
information/NN
management/NN
system/NN
is/VBZ
an/DT
electronic/JJ
archives/NNS
management/NN
system/NN
that/WD
processes/VBZ
large/JJ
number/NN
of/IN
book/NN
information/NN
using/VBG
computer/NN
The/DT
needs/NNS
of/IN
three/CD
sorts/NNS
of/IN
users/NNS
must/MD
be/VB
met/VBN
by/IN
this/DT
system/NN
member/NN
librarians/VBZ
author/NN
and/CC

library/NN
to/TO
check/VB
for/IN
another/DT
branch/NN
if/IN
found/VBN
Many/JJ
individuals/NNS
can/MD
be/VB
categorized/VBN
as/IN
user/NN
or/CC
librarian/JJ
based/VBN
on/IN
their/PRP\$
status/NN
and/CC
only/RB
one/CD
person/NN
serves/VBZ
as/IN
the/DT
system/NN
administrator/VBD
The/DT
readers/NNS
behaviour/VBP
is/VBZ
to/TO
query/VB
the/DT
personal/JJ
information/NN
to/TO
query/VB
the/DT
books/NNS
to/TO
book/NN
borrow/NN
and/CC
return/VB
them/PRP
In/IN
case/NN
of/IN
the/DT
due/JJ
date/NN
of/IN
borrowing/VBG
book/NN
has/VBZ
passed/VBN
the/DT

member/NN
will/MD
be/VB
obliged/VBN
to/TO
pay/VB
fine/VB
A/DT
library/JJ
database/NN
must/MD
store/VB
information/NN
about/IN
its/PRP\$
members/NNS
librarian/JJ
and/CC
the/DT
rack/NN
number/NN
of/IN
the/DT
book/NN
where/WRB
it/PRP
can/MD
be/VB
found/VBN
Each/DT
book/NN
item/NN
status/NN
descriptive/JJ
attributes/NNS
and/CC
cost/NN
for/IN
losses/NNS
and/CC
late/JJ
returns/NNS
must/MD
be/VB
tracked/VBN
by/IN
the/DT
library/librarian/JJ
The/DT
(ORGANIZATION ISBN/NNP)
of/IN
books/NNS
will/MD
be/VB
used/VBN
to/TO
identify/VB
them/PRP
Each/DT
book/NN
will/MD

have/VB
unique/JJ
(ORGANIZATION ISBN/NNP)
in/IN
order/NN
to/TO
allow/VB
multiple/JJ
copies/NNS
of/IN
the/DT
same/JJ
book/NN
For/IN
the/DT
users/NNS
to/TO
be/VB
member/NN
they/PRP
need/VBP
to/TO
apply/VB
for/IN
library/JJ
card/NN
where/WRB
details/NNS
about/IN
the/DT
member/NN
can/MD
identified/VB
card/JJ
number/NN
barcode/JJ
issue/NN
date/NN
and/CC
active/JJ
status/NN
Furthermore/NNP
when/WRB
applying/VBG
for/IN
library/JJ
card/NN
members/NNS
must/MD
create/VB
an/DT
account/NN
then/RB
they/PRP
will/MD
be/VB
given/VBN
unique/JJ
ID/NNP
their/PRP\$
names/NNS

and/CC
password/NN
that/WDT
can/MD
be/VB
reset/VBN
later/RB
after/IN
account/NN
activation/NN
by/IN
librarian/JJ
In/IN
addition/NN
library/JJ
card/NN
will/MD
be/VB
required/VBN
for/IN
checkout/NN
operations/NNS
The/DT
library/JJ
card/NN
will/MD
have/VB
its/PRP\$
own/JJ
fines/NNS
but/CC
any/DT
outstanding/JJ
fines/NNS
on/IN
member/NN
s/NN
cards/NNS
will/MD
prevent/VB
them/PRP
from/IN
using/VBG
the/DT
library/NN
services/NNS
The/DT
system/NN
primary/JJ
users/NNS
are/VBP
librarians/VBZ
They/PRP
are/VBP
in/IN
charge/NN
of/IN
day-to-day/JJ
management/NN
and/CC
service/NN

operations/NNS
such/JJ
as/IN
book/NN
ordering/VBG
new/JJ
book/NN
verification/NN
book/NN
registration/NN
borrow/NN
and/CC
return/VB
books/NNS
from/IN
members/NNS
and/CC
so/RB
on/IN
The/DT
librarians/NNS
are/VBP
also/RB
in/IN
charge/NN
of/IN
all/DT
issues/NNS
concerning/VBG
books/NNS
including/VBG
book/NN
status/NN
borrowed/VBD
not/RB
found/VBN
and/CC
etc/JJ
library/JJ
management/NN
to/TO
check/VB
if/IN
the/DT
book/NN
can/MD
be/VB
found/VBN
in/IN
another/DT
branch/NN
The/DT
key/JJ
point/NN
among/IN
them/PRP
is/VBZ
system/NN
maintenance/NN
which/WD
includes/VBZ

the/DT
maintenance/NN
of/IN
member/NN
rights/NNS
and/CC
account/NN
details/NNS
the/DT
creation/NN
and/CC
activation/deactivation/NN
of/IN
members/NNS
account/VBP
fine/JJ
payment/NN
and/CC
so/RB
on/IN
For/IN
further/JJ
elaboration/NN
check/VB
our/PRP\$
Library/NNP
Management/NNP
System/NNP
Librarian/JJ
state/NN
machine/NN
diagram/NN
-/NN
This/DT
diagram/NN
depicts/VBZ
the/DT
activities/NNS
and/CC
scenarios/NNS
that/WDT
occur/VBP
when/WRB
member/NN
checks/VBZ
out/RP
book/NN
The/DT
actions/NNS
and/CC
decisions/NNS
were/VBD
all/DT
highlighted/VBN
in/IN
the/DT
state/NN
machine/NN
diagram/NN
see/VBP
figure/NN

2/CD
While/IN
designing/VBG
our/PRP\$
Library/NNP
Management/NNP
System/NNP
we/PRP
will/MD
concentrate/VB
on/IN
the/DT
following/JJ
requirements/NNS
(PERSON Books/NNP)
should/MD
be/VB
searchable/JJ
by/IN
title/NN
author/NN
subject/JJ
category/NN
and/CC
publication/NN
date/NN
for/IN
any/DT
library/JJ
member/NN
Each/DT
book/NN
will/MD
have/VB
unique/JJ
identification/NN
number/NN
as/RB
well/RB
as/IN
other/JJ
details/NNS
such/JJ
as/IN
rack/NN
number/NN
that/WDT
will/MD
aid/VB
in/IN
physically/RB
locating/VBG
the/DT
book/NN
A/DT
book/NN
might/MD
have/VB
multiple/JJ
copies/NNS
and/CC

library/JJ
users/NNS
should/MD
be/VB
able/JJ
to/TO
borrow/VB
and/CC
reserve/VB
any/DT
of/IN
them/PRP
Each/DT
copy/NN
of/IN
book/NN
will/MD
be/VB
referred/VBN
to/TO
as/IN
book/NN
item/NN
The/DT
system/NN
should/MD
be/VB
able/JJ
to/TO
retrieve/VB
information/NN
such/JJ
as/IN
who/WP
took/VBD
specific/JJ
book/NN
or/CC
what/WP
books/NNS
are/VBP
checked/VBN
out/RP
by/IN
specific/JJ
library/JJ
member/NN
There/EX
should/MD
be/VB
maximum/JJ
limit/NN
of/IN
5/CD
books/NNS
that/IN
member/NN
can/MD
check/VB
out/RP
A/DT

member/NN
should/MD
be/VB
allowed/VBN
to/TO
keep/VB
book/NN
for/IN
maximum/NN
of/IN
10/CD
days/NNS
For/IN
books/NNS
returned/VBN
after/IN
the/DT
due/JJ
date/NN
the/DT
user/customer/JJ
must/MD
pay/VB
fine/JJ
Members/NNS
should/MD
be/VB
able/JJ
to/TO
reserve/VB
books/NNS
that/WDT
are/VBP
currently/RB
unavailable/JJ
The/DT
system/NN
should/MD
be/VB
able/JJ
to/TO
send/VB
notifications/NNS
when/WRB
reserved/VBN
books/NNS
become/VB
available/JJ
as/RB
well/RB
as/IN
when/WRB
the/DT
book/NN
is/VBZ
not/RB
returned/VBN
by/IN
the/DT
due/JJ
date/NN

Each/DT
book/NN
and/CC
member/NN
will/MD
have/VB
their/PRP\$
own/JJ
barcode/NN
The/DT
system/NN
will/MD
be/VB
able/JJ
to/TO
read/VB
barcodes/NNS
from/IN
books/NNS
as/RB
well/RB
as/IN
library/JJ
cards/NNS
from/IN
members/NNS
In/IN
our/PRP\$
system/NN
there/EX
are/VBP
three/CD
main/JJ
actors/NNS
Librarians/NNPS
are/VBP
primarily/RB
in/IN
charge/NN
of/IN
adding/VBG
and/CC
modifying/VBG
books/NNS
book/NN
items/NNS
and/CC
users/NNS
In/IN
addition/NN
the/DT
(GPE Librarian/JJ)
can/MD
issue/VB
reserve/NN
and/CC
return/VB
book/NN
items/NNS
Member/NNP
All/NNP

members/NNS
have/VBP
access/NN
to/TO
the/DT
catalogue/NN
and/CC
can/MD
check/VB
out/RP
reserve/NN
renew/NN
and/CC
return/VB
books/NNS
(PERSON System/NNP)
Is/VBZ
primarily/RB
in/IN
charge/NN
of/IN
sending/VBG
notifications/NNS
for/IN
overdue/JJ
books/NNS
cancelled/VBD
reservations/NNS
and/CC
so/RB
on/IN
Our/PRP\$
Library/NNP
Management/NNP
System/NNP
is/VBZ
divided/VBN
into/IN
the/DT
following/JJ
classes/NNS
Library/VBP
The/DT
heart/NN
of/IN
the/DT
organization/NN
for/IN
which/WD
this/DT
software/NN
was/VBD
created/VBN
It/PRP
has/VBZ
attributes/NNS
such/JJ
as/IN
'Name/NN
to/TO
differentiate/VB

it/PRP
from/IN
other/JJ
libraries/NNS
and/CC
'Address/NN
to/TO
describe/VB
its/PRP\$
location/NN
the/DT
class/NN
should/MD
be/VB
able/JJ
to/TO
identify/VB
in/IN
which/WD
branch/NN
is/VBZ
the/DT
book/NN
located/VBN
Book/NNP
The/DT
system/NN
fundamental/JJ
building/NN
block/NN
Every/NNP
book/NN
will/MD
have/VB
an/DT
(ORGANIZATION ISBN/NNP)
title/NN
and/CC
subject/JJ
(PERSON Book/NNP Item/NNP Any/NNP)
book/NN
can/MD
have/VB
multiple/JJ
copies/NNS
and/CC
each/DT
copy/NN
is/VBZ
treated/VBN
as/IN
book/NN
item/NN
in/IN
our/PRP\$
system/NN
Each/DT
book/NN
will/MD
have/VB
its/PRP\$

own/JJ
barcode/NN
In/IN
addition/NN
giving/VBG
information/NN
if/IN
the/DT
book/NN
is/VBZ
borrowed/VBN
and/CC
when/WRB
it/PRP
should/MD
be/VB
returned/VBN
by/IN
the/DT
members/NNS
user/POS
Information/NNP
also/RB
about/IN
the/DT
publication/NN
date/NN
of/IN
the/DT
book/NN
and/CC
date/NN
of/IN
purchase/NN
if/IN
the/DT
member/NN
bought/VBD
it/PRP
As/IN
an/DT
operation/NN
process/NN
librarian/NN
should/MD
be/VB
able/JJ
to/TO
check/VB
out/RP
the/DT
book/NN
Account/NNP
There/EX
will/MD
be/VB
two/CD
types/NNS
of/IN
accounts/NNS
in/IN

the/DT
system/NN
one/CD
for/IN
general/JJ
members/NNS
and/CC
one/CD
for/IN
librarians/NNS
where/WRB
every/DT
class/NN
will/MD
have/VB
its/PRP\$
own/JJ
id/NN
password/NN
and/CC
username/JJ
Member/NNP
or/CC
librarian/JJ
should/MD
be/VB
able/JJ
to/TO
reset/VB
their/PRP\$
passwords/NNS
(PERSON Library/NNP Card/NNP)
A/NNP
library/JJ
card/NN
will/MD
be/VB
issued/VBN
to/TO
each/DT
library/NN
user/NN
which/WD
will/MD
be/VB
used/VBN
to/TO
identify/VB
users/NNS
when/WRB
issuing/VBG
or/CC
returning/VBG
books/NNS
Where/WRB
there/EX
will/MD
be/VB
unidirectional/JJ
association/NN
with/IN

the/DT
(ORGANIZATION Account/NNP)
details/NNS
Additionally/RB
it/PRP
should/MD
hold/VB
information/NN
like/IN
card/NN
number/NN
barcode/JJ
issue/NN
date/NN
and/CC
account/NN
status/NN
(PERSON Book/NNP Reservation/NNP)
In/IN
charge/NN
of/IN
managing/VBG
reservations/NNS
for/IN
book/NN
items/NNS
based/VBN
on/IN
the/DT
creation/NN
date/NN
and/CC
status/NN
If/IN
the/DT
account/NN
is/VBZ
active/JJ
book/NN
reservation/NN
can/MD
be/VB
confirmed/VBN
(PERSON Book/NNP Lending/NNP)
Manage/NNP
the/DT
loaning/NN
of/IN
books/NNS
(PERSON Due/NNP)
date/NN
&/CC
return/NN
date/NN
should/MD
be/VB
known/VBN
(PERSON Catalogue/NNP)
A/NNP
list/NN
of/IN

books/NNS
sorted/VBN
according/VBG
to/TO
certain/JJ
criteria/NNS
Our/PRP\$
system/NN
will/MD
allow/VB
you/PRP
to/TO
search/VB
four/CD
catalogues/NNS
by/IN
title/NN
author/NN
subject/NN
and/CC
publish/JJ
date/NN
Fines/NNS
in/IN
case/NN
the/DT
lend/NN
book/NN
is/VBZ
not/RB
returned/VBN
by/IN
the/DT
due/JJ
date/NN
specified/VBN
in/IN
the/DT
(ORGANIZATION Book/NNP)
Lending/NNP
class/NN
This/DT
class/NN
will/MD
be/VB
in/IN
charge/NN
of/IN
calculating/VBG
and/CC
collecting/VBG
fines/NNS
from/IN
library/JJ
patrons/NNS
Bill/VBP
this/DT
class/NN
will/MD
be/VB
referred/VBN

from/IN
the/DT
transaction/NN
to/TO
be/VB
paid/VBN
by/IN
the/DT
member/NN
And/CC
librarian/NN
will/MD
be/VB
able/JJ
to/TO
create/VB
issue/NN
and/CC
update/JJ
bill/NN
Author/NNP
This/DT
class/NN
will/MD
focus/VB
on/IN
the/DT
author/NN
of/IN
book/NN
,/,
storing/VBG
name/NN
of/IN
the/DT
book/NN
and/CC
brief/JJ
description/NN
./.
(PERSON Rack/NNP Books/NNP)
will/MD
be/VB
arranged/VBN
on/IN
shelves/NNS
./.
Each/DT
rack/NN
will/MD
be/VB
identified/VBN
by/IN
a/DT
rack/NN
number/NN
and/CC
a/DT
location/NN
identifier/NN
that/WDT

describes/VBZ
the/DT
rack/NN
physical/JJ
location/NN
in/IN
the/DT
library/NN
./.
Notification/NN
This/DT
class/NN
will/MD
handle/VB
sending/VBG
notifications/NNS
to/TO
library/JJ
users/NNS
to/TO
their/PRP\$
email/NN
addresses/NNS
./.)

In [7]:



```
from nltk.stem import PorterStemmer
from nltk.stem import LancasterStemmer
from nltk.stem import SnowballStemmer
porter = PorterStemmer()
lancaster=LancasterStemmer()
snowball= SnowballStemmer(language='english')

punctuations="?:!.,;a"
sentence_words = nltk.word_tokenize(sentence)
for word in sentence_words:
    if word in punctuations:
        sentence_words.remove(word)

entities = nltk.chunk.ne_chunk(tagged)
print('entities: ',entities)

#words to be stemmed
sentence_words
print("{0:20}{1:20}{2:20}{3:20}".format("Word","Porter Stemmer","lancaster Stemmer", "Snowb

sentence_words
for word in sentence_words:
    print("{0:20}{1:20}{2:20}{3:20}".format(word, porter.stem(word),lancaster.stem(word), s
```

```
entities: (S
  In/IN
  most/JJS
  cases/NNS
  requirement/JJ
  analysis/NN
  is/VBZ
  performed/VBN
  to/TO
  determine/VB
  the/DT
  system/NN
  function/NN
  and/CC
  user/JJ
  interface/NN
  It/PRP
  enables/VBZ
  users/NNS
  to/TO
  comprehend/VB
  system/NN
  functionality/NN
  and/CC
  developers/NNS
  to/TO
  understand/VB
  the/DT
  system/NN
  requirements/NNS
  The/DT
  requirements/NNS
  analysis/NN
```

principal/JJ
task/NN
is/VBZ
to/TO
identify/VB
system/NN
use/NN
cases/NNS
diagram/VBP
and/CC
create/VBP
system/NN
requirements/NNS
model/VBP
The/DT
use/NN
of/IN
case/NN
diagram/NN
state/NN
machine/NN
diagram/NN
and/CC
sequence/NN
diagram/NN
are/VBP
the/DT
major/JJ
outcomes/NNS
Requirements/NNPS
analysis/NN
phase/NN
First/NNP
we/PRP
are/VBP
analysing/VBG
and/CC
refine/VB
the/DT
requirements/NNS
of/IN
the/DT
system/NN
In/IN
addition/NN
Listing/VBG
the/DT
involved/JJ
operators/NNS
in/IN
the/DT
system/NN
and/CC
identify/VB
all/PDT
the/DT
use/NN
cases/NNS
and/CC
roles/NNS
to/TO

describe/VB
And/CC
then/RB
to/TO
analyse/VB
the/DT
relationship/NN
between/IN
the/DT
roles/NNS
and/CC
the/DT
cases/NNS
and/CC
use/VB
(ORGANIZATION UML/NNP)
modelling/VBG
tool/NN
to/TO
draw/VB
the/DT
case/NN
diagram/NN
(PERSON System/NNP)
analysis/NN
and/CC
design/NN
phase/NN
Identify/NNP
all/PDT
the/DT
needs/NNS
of/IN
the/DT
system/NN
Abstract/NNP
the/DT
classes/NNS
from/IN
the/DT
actual/JJ
needs/NNS
and/CC
describe/VB
the/DT
relationship/NN
between/IN
these/DT
classes/NNS
Extracting/VBG
our/PRP\$
attributes/NNS
actors/NNS
and/CC
classes/NNS
from/IN
analysing/VBG
our/PRP\$
text/NN
in/IN
the/DT

(ORGANIZATION Natural/NNP)
Language/NNP
Processing/VBG
with/IN
(PERSON Python/NNP NLP/NNP)
using/VBG
(ORGANIZATION NLTK/NNP)
library/JJ
Phase/NNP
of/IN
system/NN
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The/DT
model/NN
in/IN
the/DT
first/JJ
two/CD
phases/NNS
is/VBZ
actually/RB
created/VBN
in/IN
system/NN
logic/JJ
aspect/NN
This/DT
phase/NN
is/VBZ
to/TO
accomplish/VB
the/DT
physical/JJ
realization/NN
of/IN
the/DT
system/NN
such/JJ
as/IN
main/JJ
classes/NNS
operators/NNS
or/CC
associations/NNS
and/CC
attributes/VBZ
The/DT
library/JJ
information/NN
management/NN
system/NN
is/VBZ
an/DT
electronic/JJ
archives/NNS
management/NN
system/NN
that/WDT
processes/VBZ
large/JJ
number/NN

of/IN
book/NN
information/NN
using/VBG
computer/NN
The/DT
needs/NNS
of/IN
three/CD
sorts/NNS
of/IN
users/NNS
must/MD
be/VB
met/VBN
by/IN
this/DT
system/NN
member/NN
librarians/VBZ
author/NN
and/CC
library/NN
to/TO
check/VB
for/IN
another/DT
branch/NN
if/IN
found/VBN
Many/JJ
individuals/NNS
can/MD
be/VB
categorized/VBN
as/IN
user/NN
or/CC
librarian/JJ
based/VBN
on/IN
their/PRP\$
status/NN
and/CC
only/RB
one/CD
person/NN
serves/VBZ
as/IN
the/DT
system/NN
administrator/VBD
The/DT
readers/NNS
behaviour/VBP
is/VBZ
to/TO
query/VB
the/DT
personal/JJ
information/NN

to/TO
query/VB
the/DT
books/NNS
to/TO
book/NN
borrow/NN
and/CC
return/VB
them/PRP
In/IN
case/NN
of/IN
the/DT
due/JJ
date/NN
of/IN
borrowing/VBG
book/NN
has/VBZ
passed/VBN
the/DT
member/NN
will/MD
be/VB
obliged/VBN
to/TO
pay/VB
fine/VB
A/DT
library/JJ
database/NN
must/MD
store/VB
information/NN
about/IN
its/PRP\$
members/NNS
librarian/JJ
and/CC
the/DT
rack/NN
number/NN
of/IN
the/DT
book/NN
where/WRB
it/PRP
can/MD
be/VB
found/VBN
Each/DT
book/NN
item/NN
status/NN
descriptive/JJ
attributes/NNS
and/CC
cost/NN
for/IN
losses/NNS

and/CC
late/JJ
returns/NNS
must/MD
be/VB
tracked/VBN
by/IN
the/DT
library/librarian/JJ
The/DT
(ORGANIZATION ISBN/NNP)
of/IN
books/NNS
will/MD
be/VB
used/VBN
to/TO
identify/VB
them/PRP
Each/DT
book/NN
will/MD
have/VB
unique/JJ
(ORGANIZATION ISBN/NNP)
in/IN
order/NN
to/TO
allow/VB
multiple/JJ
copies/NNS
of/IN
the/DT
same/JJ
book/NN
For/IN
the/DT
users/NNS
to/TO
be/VB
member/NN
they/PRP
need/VBP
to/TO
apply/VB
for/IN
library/JJ
card/NN
where/WRB
details/NNS
about/IN
the/DT
member/NN
can/MD
identified/VB
card/JJ
number/NN
barcode/JJ
issue/NN
date/NN
and/CC

active/JJ
status/NN
Furthermore/NNP
when/WRB
applying/VBG
for/IN
library/JJ
card/NN
members/NNS
must/MD
create/VB
an/DT
account/NN
then/RB
they/PRP
will/MD
be/VB
given/VBN
unique/JJ
ID/NNP
their/PRP\$
names/NNS
and/CC
password/NN
that/WD
can/MD
be/VB
reset/VBN
later/RB
after/IN
account/NN
activation/NN
by/IN
librarian/JJ
In/IN
addition/NN
library/JJ
card/NN
will/MD
be/VB
required/VBN
for/IN
checkout/NN
operations/NNS
The/DT
library/JJ
card/NN
will/MD
have/VB
its/PRP\$
own/JJ
fines/NNS
but/CC
any/DT
outstanding/JJ
fines/NNS
on/IN
member/NN
s/NN
cards/NNS
will/MD

prevent/VB
them/PRP
from/IN
using/VBG
the/DT
library/NN
services/NNS
The/DT
system/NN
primary/JJ
users/NNS
are/VBP
librarians/VBZ
They/PRP
are/VBP
in/IN
charge/NN
of/IN
day-to-day/JJ
management/NN
and/CC
service/NN
operations/NNS
such/JJ
as/IN
book/NN
ordering/VBG
new/JJ
book/NN
verification/NN
book/NN
registration/NN
borrow/NN
and/CC
return/VB
books/NNS
from/IN
members/NNS
and/CC
so/RB
on/IN
The/DT
librarians/NNS
are/VBP
also/RB
in/IN
charge/NN
of/IN
all/DT
issues/NNS
concerning/VBG
books/NNS
including/VBG
book/NN
status/NN
borrowed/VBD
not/RB
found/VBN
and/CC
etc/JJ
library/JJ

management/NN
to/TO
check/VB
if/IN
the/DT
book/NN
can/MD
be/VB
found/VBN
in/IN
another/DT
branch/NN
The/DT
key/JJ
point/NN
among/IN
them/PRP
is/VBZ
system/NN
maintenance/NN
which/WDT
includes/VBZ
the/DT
maintenance/NN
of/IN
member/NN
rights/NNS
and/CC
account/NN
details/NNS
the/DT
creation/NN
and/CC
activation/deactivation/NN
of/IN
members/NNS
account/VBP
fine/JJ
payment/NN
and/CC
so/RB
on/IN
For/IN
further/JJ
elaboration/NN
check/VB
our/PRP\$
Library/NNP
Management/NNP
System/NNP
Librarian/JJ
state/NN
machine/NN
diagram/NN
-/NN
This/DT
diagram/NN
depicts/VBZ
the/DT
activities/NNS
and/CC

scenarios/NNS
that/WDT
occur/VBP
when/WRB
member/NN
checks/VBZ
out/RP
book/NN
The/DT
actions/NNS
and/CC
decisions/NNS
were/VBD
all/DT
highlighted/VBN
in/IN
the/DT
state/NN
machine/NN
diagram/NN
see/VBP
figure/NN
2/CD
While/IN
designing/VBG
our/PRP\$
Library/NNP
Management/NNP
System/NNP
we/PRP
will/MD
concentrate/VB
on/IN
the/DT
following/JJ
requirements/NNS
(PERSON Books/NNP)
should/MD
be/VB
searchable/JJ
by/IN
title/NN
author/NN
subject/JJ
category/NN
and/CC
publication/NN
date/NN
for/IN
any/DT
library/JJ
member/NN
Each/DT
book/NN
will/MD
have/VB
unique/JJ
identification/NN
number/NN
as/RB
well/RB

as/IN
other/JJ
details/NNS
such/JJ
as/IN
rack/NN
number/NN
that/WDT
will/MD
aid/VB
in/IN
physically/RB
locating/VBG
the/DT
book/NN
A/DT
book/NN
might/MD
have/VB
multiple/JJ
copies/NNS
and/CC
library/JJ
users/NNS
should/MD
be/VB
able/JJ
to/TO
borrow/VB
and/CC
reserve/VB
any/DT
of/IN
them/PRP
Each/DT
copy/NN
of/IN
book/NN
will/MD
be/VB
referred/VBN
to/TO
as/IN
book/NN
item/NN
The/DT
system/NN
should/MD
be/VB
able/JJ
to/TO
retrieve/VB
information/NN
such/JJ
as/IN
who/WP
took/VBD
specific/JJ
book/NN
or/CC
what/WP

books/NNS
are/VBP
checked/VBN
out/RP
by/IN
specific/JJ
library/JJ
member/NN
There/EX
should/MD
be/VB
maximum/JJ
limit/NN
of/IN
5/CD
books/NNS
that/IN
member/NN
can/MD
check/VB
out/RP
A/DT
member/NN
should/MD
be/VB
allowed/VBN
to/TO
keep/VB
book/NN
for/IN
maximum/NN
of/IN
10/CD
days/NNS
For/IN
books/NNS
returned/VBN
after/IN
the/DT
due/JJ
date/NN
the/DT
user/customer/JJ
must/MD
pay/VB
fine/JJ
Members/NNS
should/MD
be/VB
able/JJ
to/TO
reserve/VB
books/NNS
that/WDT
are/VBP
currently/RB
unavailable/JJ
The/DT
system/NN
should/MD
be/VB

able/JJ
to/TO
send/VB
notifications/NNS
when/WRB
reserved/VBN
books/NNS
become/VB
available/JJ
as/RB
well/RB
as/IN
when/WRB
the/DT
book/NN
is/VBZ
not/RB
returned/VBN
by/IN
the/DT
due/JJ
date/NN
Each/DT
book/NN
and/CC
member/NN
will/MD
have/VB
their/PRP\$
own/JJ
barcode/NN
The/DT
system/NN
will/MD
be/VB
able/JJ
to/TO
read/VB
barcodes/NNS
from/IN
books/NNS
as/RB
well/RB
as/IN
library/JJ
cards/NNS
from/IN
members/NNS
In/IN
our/PRP\$
system/NN
there/EX
are/VBP
three/CD
main/JJ
actors/NNS
Librarians/NNPS
are/VBP
primarily/RB
in/IN
charge/NN

of/IN
adding/VBG
and/CC
modifying/VBG
books/NNS
book/NN
items/NNS
and/CC
users/NNS
In/IN
addition/NN
the/DT
(GPE Librarian/JJ)
can/MD
issue/VB
reserve/NN
and/CC
return/VB
book/NN
items/NNS
Member/NNP
All/NNP
members/NNS
have/VBP
access/NN
to/TO
the/DT
catalogue/NN
and/CC
can/MD
check/VB
out/RP
reserve/NN
renew/NN
and/CC
return/VB
books/NNS
(PERSON System/NNP)
Is/VBZ
primarily/RB
in/IN
charge/NN
of/IN
sending/VBG
notifications/NNS
for/IN
overdue/JJ
books/NNS
cancelled/VBD
reservations/NNS
and/CC
so/RB
on/IN
Our/PRP\$
Library/NNP
Management/NNP
System/NNP
is/VBZ
divided/VBN
into/IN
the/DT

following/JJ
classes/NNS
Library/VBP
The/DT
heart/NN
of/IN
the/DT
organization/NN
for/IN
which/WD
this/DT
software/NN
was/VBD
created/VBN
It/PRP
has/VBZ
attributes/NNS
such/JJ
as/IN
'Name/NN
to/TO
differentiate/VB
it/PRP
from/IN
other/JJ
libraries/NNS
and/CC
'Address/NN
to/TO
describe/VB
its/PRP\$
location/NN
the/DT
class/NN
should/MD
be/VB
able/JJ
to/TO
identify/VB
in/IN
which/WD
branch/NN
is/VBZ
the/DT
book/NN
located/VBN
Book/NNP
The/DT
system/NN
fundamental/JJ
building/NN
block/NN
Every/NNP
book/NN
will/MD
have/VB
an/DT
(ORGANIZATION ISBN/NNP)
title/NN
and/CC
subject/JJ

(PERSON Book/NNP Item/NNP Any/NNP)

book/NN

can/MD

have/VB

multiple/JJ

copies/NNS

and/CC

each/DT

copy/NN

is/VBZ

treated/VBN

as/IN

book/NN

item/NN

in/IN

our/PRP\$

system/NN

Each/DT

book/NN

will/MD

have/VB

its/PRP\$

own/JJ

barcode/NN

In/IN

addition/NN

giving/VBG

information/NN

if/IN

the/DT

book/NN

is/VBZ

borrowed/VBN

and/CC

when/WRB

it/PRP

should/MD

be/VB

returned/VBN

by/IN

the/DT

members/NNS

user/POS

Information/NNP

also/RB

about/IN

the/DT

publication/NN

date/NN

of/IN

the/DT

book/NN

and/CC

date/NN

of/IN

purchase/NN

if/IN

the/DT

member/NN

bought/VBD

it/PRP

As/IN
an/DT
operation/NN
process/NN
librarian/NN
should/MD
be/VB
able/JJ
to/TO
check/VB
out/RP
the/DT
book/NN
Account/NNP
There/EX
will/MD
be/VB
two/CD
types/NNS
of/IN
accounts/NNS
in/IN
the/DT
system/NN
one/CD
for/IN
general/JJ
members/NNS
and/CC
one/CD
for/IN
librarians/NNS
where/WRB
every/DT
class/NN
will/MD
have/VB
its/PRP\$
own/JJ
id/NN
password/NN
and/CC
username/JJ
Member/NNP
or/CC
librarian/JJ
should/MD
be/VB
able/JJ
to/TO
reset/VB
their/PRP\$
passwords/NNS
(PERSON Library/NNP Card/NNP)
A/NNP
library/JJ
card/NN
will/MD
be/VB
issued/VBN
to/TO

each/DT
library/NN
user/NN
which/WDT
will/MD
be/VB
used/VBN
to/TO
identify/VB
users/NNS
when/WRB
issuing/VBG
or/CC
returning/VBG
books/NNS
Where/WRB
there/EX
will/MD
be/VB
unidirectional/JJ
association/NN
with/IN
the/DT
(ORGANIZATION Account/NNP)
details/NNS
Additionally/RB
it/PRP
should/MD
hold/VB
information/NN
like/IN
card/NN
number/NN
barcode/JJ
issue/NN
date/NN
and/CC
account/NN
status/NN
(PERSON Book/NNP Reservation/NNP)
In/IN
charge/NN
of/IN
managing/VBG
reservations/NNS
for/IN
book/NN
items/NNS
based/VBN
on/IN
the/DT
creation/NN
date/NN
and/CC
status/NN
If/IN
the/DT
account/NN
is/VBZ
active/JJ
book/NN

reservation/NN
can/MD
be/VB
confirmed/VBN
(PERSON Book/NNP Lending/NNP)
Manage/NNP
the/DT
loaning/NN
of/IN
books/NNS
(PERSON Due/NNP)
date/NN
&/CC
return/NN
date/NN
should/MD
be/VB
known/VBN
(PERSON Catalogue/NNP)
A/NNP
list/NN
of/IN
books/NNS
sorted/VBN
according/VBG
to/TO
certain/JJ
criteria/NNS
Our/PRP\$
system/NN
will/MD
allow/VB
you/PRP
to/TO
search/VB
four/CD
catalogues/NNS
by/IN
title/NN
author/NN
subject/NN
and/CC
publish/JJ
date/NN
Fines/NNS
in/IN
case/NN
the/DT
lend/NN
book/NN
is/VBZ
not/RB
returned/VBN
by/IN
the/DT
due/JJ
date/NN
specified/VBN
in/IN
the/DT
(ORGANIZATION Book/NNP)

Lending/NNP
class/NN
This/DT
class/NN
will/MD
be/VB
in/IN
charge/NN
of/IN
calculating/VBG
and/CC
collecting/VBG
fines/NNS
from/IN
library/JJ
patrons/NNS
Bill/VBP
this/DT
class/NN
will/MD
be/VB
referred/VBN
from/IN
the/DT
transaction/NN
to/TO
be/VB
paid/VBN
by/IN
the/DT
member/NN
And/CC
librarian/NN
will/MD
be/VB
able/JJ
to/TO
create/VB
issue/NN
and/CC
update/JJ
bill/NN
Author/NNP
This/DT
class/NN
will/MD
focus/VB
on/IN
the/DT
author/NN
of/IN
book/NN
,/,
storing/VBG
name/NN
of/IN
the/DT
book/NN
and/CC
brief/JJ
description/NN

./.
 (PERSON Rack/NNP Books/NNP)
 will/MD
 be/VB
 arranged/VBN
 on/IN
 shelves/NNS
 ./.
 Each/DT
 rack/NN
 will/MD
 be/VB
 identified/VBN
 by/IN
 a/DT
 rack/NN
 number/NN
 and/CC
 a/DT
 location/NN
 identifier/NN
 that/WDT
 describes/VBZ
 the/DT
 rack/NN
 physical/JJ
 location/NN
 in/IN
 the/DT
 library/NN
 ./.
 Notification/NN
 This/DT
 class/NN
 will/MD
 handle/VB
 sending/VBG
 notifications/NNS
 to/TO
 library/JJ
 users/NNS
 to/TO
 their/PRP\$
 email/NN
 addresses/NNS
 ./.)

Word	Porter Stemmer	lancaster Stemmer	Snowball Stemmer
In	in	in	in
most	most	most	most
cases	case	cas	case
requirement	requir	requir	requir
analysis	analysi	analys	analysi
is	is	is	is
performed	perform	perform	perform
to	to	to	to
determine	determin	determin	determin
the	the	the	the
system	system	system	system
function	function	funct	function
and	and	and	and
user	user	us	user

interface
It enables users to comprehend system functionality and developers to understand the system requirements. The requirements analysis

principal task is to identify system use cases diagram and create system requirements model. The use of case diagram, state machine diagram and sequence diagram are the major outcomes. Requirements analysis phase. First we are analysing and refine the requirements of the

interfac
it enabl
user to comprehend system function and develop to understand the system requir the requir analysi

princip
task is to identifi system use case diagram and creat system requir model the use of case diagram state machin diagram and sequenc diagram are the major outcom requir analysi phase first we are analys and refin the requir of the

interfac
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us to comprehend system funct and develop to understand the system requir the requir analys

princip
task is to ident system us cas diagram and creat system requir model the us of cas diagram stat machin diagram and sequ diagram ar the maj outcom requir analys phas first we ar analys and refin the requir of the

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user to comprehend system function and develop to understand the system requir the requir analysi

princip
task is to identifi system use case diagram and creat system requir model the use of case diagram state machin diagram and sequenc diagram are the major outcom requir analysi phase first we are analys and refin the requir of the

system
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identify
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use
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describe
And
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to
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relationship
between
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roles
and
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cases
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use
UML
modelling
tool
to
draw
the
case
diagram
System
analysis
and
design
phase
Identify
all
the
needs
of
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system
Abstract
the
classes
from
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and describe the relationship between these classes
Extracting our attributes actors and classes from analysing our text in the Natural Language Processing with Python (NLP) using NLTK library
Phase of system implementation
The model in the first two phases is actually created in system logic aspect
This phase is to accomplish the physical realization of the system such as

and describ the relationship between these class
extract our attribut actor and class from analys our text in the natur languag process with python (nlp) use nltk librari
phase of system implement the model in the first two phase is actual creat in system logic aspect
thi phase is to accomplish the physic realiz of the system such as

and describ the rel between theses class
extract our attribut act and class from analys our text in the nat langu process with python (nlp) us nltk libr
phas of system impl the model in the first two phas is act cre in system log aspect
thi phas is to accompl the phys real of the system such as

and describ the relationship between these class
extract our attribut actor and class from analys our text in the natur languag process with python (nlp) use nltk librari
phase of system implement the model in the first two phase is actual creat in system logic aspect
this phase is to accomplish the physic realize of the system such as

main
classes
operators
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The
library
information
management
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number
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book
information
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computer
The
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users
must
be
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librarians
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and
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Many
individuals
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user

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and
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the
need
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sort
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and
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system
that
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number
of
book
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use
comput
the
need
of
three
sort
of
user
must
be
met
by
this
system
member
librarian
author
and
librari
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branch
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user

or
librarian
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status
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person
serves
as
the
system
administrator
The
readers
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behaviour
is
to
query
the
personal
information
to
query
the
books
to
book
borrow
and
return
them
In
case
of
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activation by librarian) In addition library card will be required for checkout operations The library card will have its own fines but any outstanding fines on member , s cards will prevent them from using the library 's services The system 's primary users are librarians They are in charge of day-to-day management and service operations such as book ordering	activ by librarian) in addit librari card will be requir for checkout oper the librari card will have it own fine but ani outstand fine on member , s card will prevent them from use the librari 's servic the system 's primari user are librarian they are in charg of day-to-day manag and servic oper such as book order	act by libr) in addit libr card wil be requir for checkout op the libr card wil hav it own fin but any outstand fin on memb , s card wil prev them from us the libr 's serv the system 's prim us ar libr they ar in charg of day-to-day man and serv op such as book ord	activ by librarian) in addit librari card will be requir for checkout oper the librari card will have it own fine but ani outstand fine on member , s card will prevent them from use the librari 's servic the system 's primari user are librarian they are in chang of day-to-day manag and servic oper such as book order
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<p>maintenance of member rights and account details the creation and activation/deactivation of members ,</p> <p>account fine payment and so on For further elaboration check our Library Management System (Librarian) state machine diagram - This diagram depicts the activities and</p>	<p>mainten of member right and account detail the creation and activation/deactiv of member ,</p> <p>account fine payment and so on for further elabor check our librari manag system (librarian) state machin diagram - thi diagram depict the activ and</p>	<p>maint of memb right and account detail the cre and activation/deactiva of memb ,</p> <p>account fin pay and so on for furth elab check our libr man system (libr) stat machin diagram - thi diagram depict the act and</p>	<p>mainten of member right and account detail the creation and activation/deactivation of member ,</p> <p>account fine payment and so on for further elabor check our librari manag system (librarian) state machin diagram - this diagram depict the activ and</p>
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<p>scenarios that occur when member checks out book The actions and decisions were all highlighted in the</p>	<p>scenario that occur when member check out book the action and decis were all highlight in the</p>	<p>scenario that occ when memb check out book the act and decid wer al highlight in the</p>	<p>scenario that occur when member check out book the action and decis were all highlight in the</p>
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state	state	stat	state
machine	machin	machin	machin
diagram	diagram	diagram	diagram
see	see	see	see
figure	figur	fig	figur
2	2	2	2
While	while	whil	while
designing	design	design	design
our	our	our	our
Library	librari	libr	librari
Management	manag	man	manag
System	system	system	system
we	we	we	we
will	will	wil	will
concentrate	concentr	cont	concentr
on	on	on	on
the	the	the	the
following	follow	follow	follow
requirements	requir	requir	requir
Books	book	book	book
should	should	should	should
be	be	be	be
searchable	searchabl	search	searchabl
by	by	by	by
title	titl	titl	titl
author	author	auth	author
subject	subject	subject	subject
category	categori	categ	categori
and	and	and	and
publication	public	publ	public
date	date	dat	date
for	for	for	for
any	ani	any	ani
library	librari	libr	librari
member	member	memb	member
Each	each	each	each
book	book	book	book
will	will	wil	will
have	have	hav	have
unique	uniqu	un	uniqu
identification	identif	id	identif
number	number	numb	number
as	as	as	as
well	well	wel	well
as	as	as	as
other	other	oth	other
details	detail	detail	detail
such	such	such	such
as	as	as	as
rack	rack	rack	rack
number	number	numb	number
that	that	that	that
will	will	wil	will
aid	aid	aid	aid
in	in	in	in
physically	physic	phys	physic
locating	locat	loc	locat
the	the	the	the
book	book	book	book
A	a	a	a
book	book	book	book

might
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and
reserve
any
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them
Each
copy
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book
will
be
referred
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The
system
should
be
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retrieve
information
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member	member	memb	member
can	can	can	can
check	check	check	check
out	out	out	out
A	a	a	a
member	member	memb	member
should	should	should	should
be	be	be	be
allowed	allow	allow	allow
to	to	to	to
keep	keep	keep	keep
book	book	book	book
for	for	for	for
maximum	maximum	maxim	maximum
of	of	of	of
10	10	10	10
days	day	day	day
For	for	for	for
books	book	book	book
returned	return	return	return
after	after	aft	after
the	the	the	the
due	due	due	due
date	date	dat	date
the	the	the	the
user/customer	user/custom	user/custom	user/custom
must	must	must	must
pay	pay	pay	pay
fine	fine	fin	fine
Members	member	memb	member
should	should	should	should
be	be	be	be
able	abl	abl	abl
to	to	to	to
reserve	reserv	reserv	reserv
books	book	book	book
that	that	that	that
are	are	ar	are
currently	current	cur	current
unavailable	unavail	unavail	unavail
The	the	the	the
system	system	system	system
should	should	should	should
be	be	be	be
able	abl	abl	abl
to	to	to	to
send	send	send	send
notifications	notif	not	notif
when	when	when	when
reserved	reserv	reserv	reserv
books	book	book	book
become	becom	becom	becom
available	avail	avail	avail
as	as	as	as
well	well	wel	well
as	as	as	as
when	when	when	when
the	the	the	the
book	book	book	book
is	is	is	is
not	not	not	not

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Each
book
and
member
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barcode
The
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barcodes
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books
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as
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members
In
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return	return	return	return
book	book	book	book
items	item	item	item
Member	member	memb	member
All	all	al	all
members	member	memb	member
have	have	hav	have
access	access	access	access
to	to	to	to
the	the	the	the
catalogue	catalogu	catalog	catalogu
and	and	and	and
can	can	can	can
check	check	check	check
out	out	out	out
reserve	reserv	reserv	reserv
renew	renew	renew	renew
and	and	and	and
return	return	return	return
books	book	book	book
System	system	system	system
Is	is	is	is
primarily	primarili	prim	primarili
in	in	in	in
charge	charg	charg	charg
of	of	of	of
sending	send	send	send
notifications	notif	not	notif
for	for	for	for
overdue	overdu	overdu	overdu
books	book	book	book
cancelled	cancel	cancel	cancel
reservations	reserv	reserv	reserv
and	and	and	and
so	so	so	so
on	on	on	on
Our	our	our	our
Library	librari	libr	librari
Management	manag	man	manag
System	system	system	system
is	is	is	is
divided	divid	divid	divid
into	into	into	into
the	the	the	the
following	follow	follow	follow
classes	class	class	class
Library	librari	libr	librari
The	the	the	the
heart	heart	heart	heart
of	of	of	of
the	the	the	the
organization	organ	org	organ
for	for	for	for
which	which	which	which
this	thi	thi	this
software	softwar	softw	softwar
was	wa	was	was
created	creat	cre	creat
It	it	it	it
has	ha	has	has
attributes	attribut	attribut	attribut

such as 'Name ,	such as 'name ,	such as 'name ,	such as name ,
to differentiate it from other libraries and 'Address ,	to differenti it from other librari and 'address ,	to differently it from oth libr and 'address ,	to differenti it from other librari and address ,
to describe its location the class should be able to identify in which branch	to describ it locat the class should be abl to identifi in which branch	to describ it loc the class should be abl to ident in which branch	to describ it locat the class should be abl to identifi in which branch

is the book located Book The system 's fundamental building block Every book will have an ISBN title and subject Book Item Any book can have multiple copies and each copy is	is the book locat book the system 's fundament build block everi book will have an isbn titl and subject book item ani book can have multipl copi and each copi is	is the book loc book the system 's funda build block every book wil hav an isbn titl and subject book item any book can hav multipl cop and each cop is	is the book locat book the system 's fundament build block everi book will have an isbn titl and subject book item ani book can have multipl copi and each copi is
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treated	treat	tre	treat
as	as	as	as
book	book	book	book
item	item	item	item
in	in	in	in
our	our	our	our
system	system	system	system
Each	each	each	each
book	book	book	book
will	will	will	will
have	have	hav	have
its	it	it	it
own	own	own	own
barcode	barcod	barcod	barcod
In	in	in	in
addition	addit	addit	addit
giving	give	giv	give
information	inform	inform	inform
if	if	if	if
the	the	the	the
book	book	book	book
is	is	is	is
borrowed	borrow	borrow	borrow
and	and	and	and
when	when	when	when
it	it	it	it
should	should	should	should
be	be	be	be
returned	return	return	return
by	by	by	by
the	the	the	the
members	member	memb	member
,	,	,	,
user	user	us	user
Information	inform	inform	inform
also	also	also	also
about	about	about	about
the	the	the	the
publication	public	publ	public
date	date	dat	date
of	of	of	of
the	the	the	the
book	book	book	book
and	and	and	and
date	date	dat	date
of	of	of	of
purchase	purchas	purchas	purchas
if	if	if	if
the	the	the	the
member	member	memb	member
bought	bought	bought	bought
it	it	it	it
As	as	as	as
an	an	an	an
operation	oper	op	oper
process	process	process	process
librarian	librarian	libr	librarian
should	should	should	should
be	be	be	be
able	abl	abl	abl
to	to	to	to

check
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Account
There
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password
and
username
Member
or
librarian
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be
able
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Library
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identify	identifi	ident	identifi
users	user	us	user
when	when	when	when
issuing	issu	issu	issu
or	or	or	or
returning	return	return	return
books	book	book	book
Where	where	wher	where
there	there	ther	there
will	will	will	will
be	be	be	be
unidirectional	unidirect	unidirect	unidirect
association	associ	assocy	associ
with	with	with	with
the	the	the	the
Account	account	account	account
details	detail	detail	detail
Additionally	addit	addit	addit
it	it	it	it
should	should	should	should
hold	hold	hold	hold
information	inform	inform	inform
like	like	lik	like
card	card	card	card
number	number	numb	number
barcode	barcod	barcod	barcod
issue	issu	issu	issu
date	date	dat	date
and	and	and	and
account	account	account	account
status	statu	stat	status
Book	book	book	book
Reservation	reserv	reserv	reserv
In	in	in	in
charge	charg	charg	charg
of	of	of	of
managing	manag	man	manag
reservations	reserv	reserv	reserv
for	for	for	for
book	book	book	book
items	item	item	item
based	base	bas	base
on	on	on	on
the	the	the	the
creation	creation	cre	creation
date	date	dat	date
and	and	and	and
status	statu	stat	status
If	if	if	if
the	the	the	the
account	account	account	account
is	is	is	is
active	activ	act	activ
book	book	book	book
reservation	reserv	reserv	reserv
can	can	can	can
be	be	be	be
confirmed	confirm	confirm	confirm
Book	book	book	book
Lending	lend	lend	lend
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Each	each	each	each
rack	rack	rack	rack
will	will	wil	will
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rack	rack	rack	rack
number	number	numb	number
and	and	and	and
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location	locat	loc	locat
identifier	identifi	ident	identifi
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describes	describ	describ	describ
the	the	the	the
rack	rack	rack	rack
's	's	's	's
physical	physic	phys	physic
location	locat	loc	locat
in	in	in	in
the	the	the	the
library	librari	libr	librari
Notification	notif	not	notif
This	thi	thi	this
class	class	class	class
will	will	wil	will
handle	handl	handl	handl
sending	send	send	send
notifications	notif	not	notif
to	to	to	to
library	librari	libr	librari
users	user	us	user
to	to	to	to
their	their	their	their
email	email	email	email
addresses	address	address	address



In [8]:



```
from nltk.stem import PorterStemmer
from nltk.stem import LancasterStemmer
from nltk.stem import SnowballStemmer
porter = PorterStemmer()
lanaster=LancasterStemmer()
snowball= SnowballStemmer(language='english')

punctuations="?:!.,;"
sentence_words = nltk.word_tokenize(sentence)
for word in sentence_words:
    if word in punctuations:
        sentence_words.remove(word)

#A list of words to be stemmed
sentence_words
print("{0:20}{1:20}{2:20}{3:20}".format("Word","Porter Stemmer","lanaster Stemmer", "Snowball Stemmer"))

sentence_words
for word in sentence_words:
    print("{0:20}{1:20}{2:20}{3:20}".format(word,porter.stem(word),lanaster.stem(word), snowball.stem(word)))
```

Word	Porter Stemmer	lanaster Stemmer	Snowball Stemmer
er			
In	in	in	in
most	most	most	most
cases	case	cas	case
requirement	requir	requir	requir
analysis	analysi	analys	analysi
is	is	is	is
performed	perform	perform	perform
to	to	to	to
determine	determin	determin	determin
the	the	the	the
system	system	system	system
function	function	funct	function
and	and	and	and
user	user	us	user
interface	interfac	interfac	interfac
It	it	it	it
enables	enabl	en	enabl
users	user	us	user
to	to	to	to
comprehend	comprehend	comprehend	comprehend
system	system	system	system
functionality	function	funct	function
and	and	and	and
developers	develop	develop	develop
to	to	to	to
understand	understand	understand	understand
the	the	the	the
system	system	system	system
requirements	requir	requir	requir
The	the	the	the
requirements	requir	requir	requir
analysis	analysi	analys	analysi
,	,	,	,
principal	princip	princip	princip
task	task	task	task

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requirements
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case
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and
sequence
diagram
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outcomes
Requirements
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Language Processing with Python (NLP) using NLTK library Phase of system implementation The model in the first two phases is actually created in a system logic aspect This phase is to accomplish the physical realization of the system such as main classes operators or associations and attributes The library information management system is an electronic archives management system that	languag process with python (nlp) use nltk librari phase of system implement the model in the first two phase is actual creat in a system logic aspect thi phase is to accomplish the physic realiz of the system such as main class oper or associ and attribut the librari inform manag system is an electron archiv manag system that	langu process with python (nlp) us nltk libr phas of system impl the model in the first two phas is act cre in a system log aspect thi phas is to accompl the phys real of the system such as main class op or assocy and attribut the libr inform man system is an electron arch man system that	languag process with python (nlp) use nltk librari phase of system implement the model in the first two phase is actual creat in a system logic aspect this phase is to accomplish the physic realize of the system such as main class oper or associ and attribut the librari inform manag system is an electron archiv manag system that
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processes	process	process	process
a	a	a	a
large	larg	larg	larg
number	number	numb	number
of	of	of	of
book	book	book	book
information	inform	inform	inform
using	use	us	use
a	a	a	a
computer	comput	comput	comput
The	the	the	the
needs	need	nee	need
of	of	of	of
three	three	three	three
sorts	sort	sort	sort
of	of	of	of
users	user	us	user
must	must	must	must
be	be	be	be
met	met	met	met
by	by	by	by
this	thi	thi	this
system	system	system	system
member	member	memb	member
librarians	librarian	libr	librarian
author	author	auth	author
and	and	and	and
library	librari	libr	librari
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to	to	to	to
check	check	check	check
for	for	for	for
another	anoth	anoth	anoth
branch	branch	branch	branch
if	if	if	if
found	found	found	found
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Many	mani	many	mani
individuals	individu	individ	individu
can	can	can	can
be	be	be	be
categorized	categor	categ	categor
as	as	as	as
user	user	us	user
or	or	or	or
a	a	a	a
librarian	librarian	libr	librarian
based	base	bas	base
on	on	on	on
their	their	their	their
status	statu	stat	status
and	and	and	and
only	onli	on	onli
one	one	on	one
person	person	person	person
serves	serv	serv	serv
as	as	as	as
the	the	the	the
system	system	system	system
administrator	administr	admin	administr
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query	queri	query	queri
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personal	person	person	person
information	inform	inform	inform
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query	queri	query	queri
the	the	the	the
books	book	book	book
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book	book	book	book
borrow	borrow	borrow	borrow
and	and	and	and
return	return	return	return
them	them	them	them
In	in	in	in
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of	of	of	of
the	the	the	the
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borrowing	borrow	borrow	borrow
a	a	a	a
book	book	book	book
has	ha	has	has
passed	pass	pass	pass
the	the	the	the
member	member	memb	member
will	will	wil	will
be	be	be	be
obliged	oblig	oblig	oblig
to	to	to	to
pay	pay	pay	pay
a	a	a	a
fine	fine	fin	fine
A	a	a	a
library	librari	libr	librari
database	databas	databas	databas
must	must	must	must
store	store	stor	store
information	inform	inform	inform
about	about	about	about
its	it	it	it
members	member	memb	member
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books from members and so on The librarians are also in charge of all issues concerning books including	book from member and so on the librarian are also in charg of all issu concern book includ	book from memb and so on the libr ar also in charg of al issu concern book includ	book from member and so on the librarian are also in charg of all issu concern book includ
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book status (borrowed not found and etc) library management (to check if the book can be found in another branch) The key point among them is system maintenance which includes the maintenance of member rights and account	book statu (borrow not found and etc) librari manag (to check if the book can be found in anoth branch) the key point among them is system mainten which includ the mainten of member right and account	book stat (borrow not found and etc) libr man (to check if the book can be found in anoth branch) the key point among them is system maint which includ the maint of memb right and account	book status (borrow not found and etc) librari manag (to check if the book can be found in anoth branch) the key point among them is system mainten which includ the mainten of member right and account
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details the creation and activation/deactivation of members , account fine payment and so on For further elaboration check our Library Management System (Librarian) state machine diagram - This diagram depicts the activities and scenarios that occur when a member checks out a book The actions and decisions were all highlighted in the state machine diagram see figure 2	detail the creation and activation/deactivation of member , account fine payment and so on for further elabor check our librari manag system (librarian) state machin diagram - thi diagram depict the activ and scenario that occur when a member check out a book the action and decis were all highlight in the state machin diagram see figur 2	detail the cre and activation/deactivation of memb , account fin pay and so on for furth elab check our libr man system (libr) stat machin diagram - thi diagram depict the act and scenario that occ when a memb check out a book the act and decid wer al highlight in the stat machin diagram see fig 2	detail the creation and activation/deactivation of member , account fine payment and so on for further elabor check our librari manag system (librarian) state machin diagram - this diagram depict the activ and scenario that occur when a member check out a book the action and decis were all highlight in the state machin diagram see figur 2
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While designing our Library Management System we will concentrate on the following requirements Books should be searchable by title author subject category and publication date for any library member Each book will have a unique identification number as well as other details such as a rack number that will aid in physically locating the book A book might have multiple copies	while design our librari manag system we will concentr on the follow requir book should be searchabl by titl author subject categori and public date for ani librari member each book will have a uniqu identif number as well as other detail such as a rack number that will aid in physic locat the book a book might have multipl copi	whil design our libr man system we wil cont on the follow requir book should be search by titl auth subject categ and publ dat for any libr memb each book wil hav a un id numb as wel as oth detail such as a rack numb that wil aid in phys loc the book a book might hav multipl cop	while design our librari manag system we will concentr on the follow requir book should be searchabl by titl author subject categori and public date for ani librari member each book will have a uniqu identif number as well as other detail such as a rack number that will aid in physic locat the book a book might have multipl copi
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and library users should be able to borrow and reserve any of them Each copy of a book will be referred to as a book item The system should be able to retrieve information such as who took a specific book or what books are checked out by a specific library member There should be a maximum limit of 5 books

and librarians should be able to borrow and reserve any of them each copy of a book will be referred to as a book item the system should be able to retrieve information such as who took a specific book or what books are checked out by a specific librarian member there should be a maximum limit of 5 books

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and librarians should be able to borrow and reserve any of them each copy of a book will be referred to as a book item the system should be able to retrieve information such as who took a specific book or what books are checked out by a specific librarian member there should be a maximum limit of 5 books

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Members
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books
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are
currently
unavailable
The
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should
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send
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reserved
books
become
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Librarian	librarian	libr	librarian
can	can	can	can
issue	issu	issu	issu
reserve	reserv	reserv	reserv
and	and	and	and
return	return	return	return
book	book	book	book
items	item	item	item
Member	member	memb	member
All	all	al	all
members	member	memb	member
have	have	hav	have
access	access	access	access
to	to	to	to
the	the	the	the
catalogue	catalogu	catalog	catalogu
and	and	and	and
can	can	can	can
check	check	check	check
out	out	out	out
reserve	reserv	reserv	reserv
renew	renew	renew	renew
and	and	and	and
return	return	return	return
books	book	book	book
System	system	system	system
Is	is	is	is
primarily	primarili	prim	primarili
in	in	in	in
charge	charg	charg	charg
of	of	of	of
sending	send	send	send
notifications	notif	not	notif
for	for	for	for
overdue	overdu	overdu	overdu
books	book	book	book
cancelled	cancel	cancel	cancel
reservations	reserv	reserv	reserv
and	and	and	and
so	so	so	so
on	on	on	on
Our	our	our	our
Library	librari	libr	librari
Management	manag	man	manag
System	system	system	system
is	is	is	is
divided	divid	divid	divid
into	into	into	into
the	the	the	the
following	follow	follow	follow
classes	class	class	class
Library	librari	libr	librari
The	the	the	the
heart	heart	heart	heart
of	of	of	of
the	the	the	the
organization	organ	org	organ
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which	which	which	which
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of
purchas
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member
bought
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as
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process

librarian	librarian	libr	librarian
should	should	should	should
be	be	be	be
able	abl	abl	abl
to	to	to	to
check	check	check	check
out	out	out	out
the	the	the	the
book	book	book	book
Account	account	account	account
There	there	ther	there
will	will	will	will
be	be	be	be
two	two	two	two
types	type	typ	type
of	of	of	of
accounts	account	account	account
in	in	in	in
the	the	the	the
system	system	system	system
one	one	on	one
for	for	for	for
general	gener	gen	general
members	member	memb	member

and	and	and	and
one	one	on	one
for	for	for	for
librarians	librarian	libr	librarian
where	where	wher	where
every	everi	every	everi
class	class	class	class
will	will	wil	will
have	have	hav	have
its	it	it	it
own	own	own	own
id	id	id	id
password	password	password	password
and	and	and	and
username	usernam	usernam	usernam
Member	member	memb	member
or	or	or	or
librarian	librarian	libr	librarian
should	should	should	should
be	be	be	be
able	abl	abl	abl
to	to	to	to
reset	reset	reset	reset
their	their	their	their
passwords	password	password	password
Library	librari	libr	librari
Card	card	card	card
A	a	a	a
library	librari	libr	librari
card	card	card	card
will	will	wil	will
be	be	be	be
issued	issu	issu	issu
to	to	to	to
each	each	each	each

library	librari	libr	librari
user	user	us	user
which	which	which	which
will	will	will	will
be	be	be	be
used	use	us	use
to	to	to	to
identify	identifi	ident	identifi
users	user	us	user
when	when	when	when
issuing	issu	issu	issu
or	or	or	or
returning	return	return	return
books	book	book	book
Where	where	wher	where
there	there	ther	there
will	will	wil	will
be	be	be	be
a	a	a	a
unidirectional	unidirect	unidirect	unidirect
association	associ	assocy	associ
with	with	with	with
the	the	the	the
Account	account	account	account
details	detail	detail	detail
Additionally	addit	addit	addit
it	it	it	it
should	should	should	should
hold	hold	hold	hold
information	inform	inform	inform
like	like	lik	like
card	card	card	card
number	number	numb	number
barcode	barcod	barcod	barcod
issue	issu	issu	issu
date	date	dat	date
and	and	and	and
account	account	account	account
status	statu	stat	status
Book	book	book	book
Reservation	reserv	reserv	reserv
In	in	in	in
charge	charg	charg	charg
of	of	of	of
managing	manag	man	manag
reservations	reserv	reserv	reserv
for	for	for	for
book	book	book	book
items	item	item	item
based	base	bas	base
on	on	on	on
the	the	the	the
creation	creation	cre	creation
date	date	dat	date
and	and	and	and
status	statu	stat	status
If	if	if	if
the	the	the	the
account	account	account	account
is	is	is	is
active	activ	act	activ

book	book	book	book
reservation	reserv	reserv	reserv
can	can	can	can
be	be	be	be
confirmed	confirm	confirm	confirm
Book	book	book	book
Lending	lend	lend	lend
Manage	manag	man	manag
the	the	the	the
loaning	loan	loan	loan
of	of	of	of
books	book	book	book
Due	due	due	due
date	date	dat	date
&	&	&	&
return	return	return	return
date	date	dat	date
should	should	should	should
be	be	be	be
known	known	known	known
Catalogue	catalogu	catalog	catalogu
A	a	a	a
list	list	list	list
of	of	of	of
books	book	book	book
sorted	sort	sort	sort
according	accord	accord	accord
to	to	to	to
certain	certain	certain	certain
criteria	criteria	criter	criteria
Our	our	our	our
system	system	system	system
will	will	wil	will
allow	allow	allow	allow
you	you	you	you
to	to	to	to
search	search	search	search
four	four	four	four
catalogues	catalogu	catalog	catalogu
by	by	by	by
title	titl	titl	titl
author	author	auth	author
subject	subject	subject	subject
and	and	and	and
publish	publish	publ	publish
date	date	dat	date
Fines	fine	fin	fine
in	in	in	in
case	case	cas	case
the	the	the	the
lend	lend	lend	lend
book	book	book	book
is	is	is	is
not	not	not	not
returned	return	return	return
by	by	by	by
the	the	the	the
due	due	due	due
date	date	dat	date
specified	specifi	spec	specifi
in	in	in	in

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Author
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author
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book
store
name
of
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book
and

a	a	a	a
brief	brief	brief	brief
description	descript	describ	descript
Rack	rack	rack	rack
Books	book	book	book
will	will	wil	will
be	be	be	be
arranged	arrang	arrang	arrang
on	on	on	on
shelves	shelv	shelv	shelv
Each	each	each	each
rack	rack	rack	rack
will	will	wil	will
be	be	be	be
identified	identifi	ident	identifi
by	by	by	by
a	a	a	a

rack	rack	rack	rack
number	number	numb	number
and	and	and	and
a	a	a	a
location	locat	loc	locat
identifier	identifi	ident	identifi
that	that	that	that
describes	describ	describ	describ
the	the	the	the
rack	rack	rack	rack
's	's	's	's
physical	physic	phys	physic
location	locat	loc	locat
in	in	in	in
the	the	the	the
library	librari	libr	librari
Notification	notif	not	notif
This	thi	thi	this
class	class	class	class
will	will	wil	will
handle	handl	handl	handl
sending	send	send	send
notifications	notif	not	notif
to	to	to	to
library	librari	libr	librari
users	user	us	user
to	to	to	to
their	their	their	their
email	email	email	email
addresses	address	address	address

In [9]:



```
import nltk
from nltk.stem import WordNetLemmatizer
wordnet_lemmatizer = WordNetLemmatizer()

punctuations="?!.,;"
sentence_words = nltk.word_tokenize(sentence)
for word in sentence_words:
    if word in punctuations:
        sentence_words.remove(word)

sentence_words
print("{0:20}{1:20}{2:20}{3:20}{4:20}".format("Word", "Verb Lemma", "Noun Lemma", "adv Lemma"))
for word in sentence_words:
    print ("{0:20}{1:20}{2:20}{3:20}{4:20}".format(word, wordnet_lemmatizer.lemmatize(word,

#print("{0:20}{1:20}".format("Word", "Lemma"))
#for word in sentence_words:
#    print ("{0:20}{1:20}".format(word,wordnet_lemmatizer.Lemmatize(word)))
```

Word	Verb Lemma	Noun Lemma	adv Lemma
adj Lemma			
In	In	In	In
In			
most	most	most	most
most			
cases	case	case	cases
cases			
requirement	requirement	requirement	requirement
requirement			
analysis	analysis	analysis	analysis
analysis			
is	be	is	is
is			
performed	perform	performed	performed
performed			
to	to	to	to
to			
determine	determine	determine	determine
determine			
the	the	the	the
the			
system	system	system	system
system			
function	function	function	function
function			
and	and	and	and
and			
user	user	user	user
user			
interface	interface	interface	interface
interface			
It	It	It	It
It			
enables	enable	enables	enables
enables			
users	users	user	users

users			
to	to	to	to
to			
comprehend	comprehend	comprehend	comprehend
comprehend			
system	system	system	system
system			
functionality	functionality	functionality	functionality
functionality			
and	and	and	and
and			
developers	developers	developer	developers
developers			
to	to	to	to
to			
understand	understand	understand	understand
understand			
the	the	the	the
the			
system	system	system	system
system			
requirements	requirements	requirement	requirements
requirements			
The	The	The	The
The			
requirements	requirements	requirement	requirements
requirements			
analysis	analysis	analysis	analysis
analysis	,	,	,
,			
,			
principal	principal	principal	principal
principal			
task	task	task	task
task			
is	be	is	is
is			
to	to	to	to
to			
identify	identify	identify	identify
identify			
system	system	system	system
system			
use	use	use	use
use			
cases	case	case	cases
cases			
diagram	diagram	diagram	diagram
diagram			
and	and	and	and
and			
create	create	create	create
create			
a	a	a	a
a			
system	system	system	system
system			
requirements	requirements	requirement	requirements
requirements			
model	model	model	model
model			

The	The	The	The
The			
use	use	use	use
use			
of	of	of	of
of			
case	case	case	case
case			
diagram	diagram	diagram	diagram
diagram			
state	state	state	state
state			
machine	machine	machine	machine
machine			
diagram	diagram	diagram	diagram
diagram			
and	and	and	and
and			
sequence	sequence	sequence	sequence
sequence			
diagram	diagram	diagram	diagram
diagram			
are	be	are	are
are			
the	the	the	the
the			
major	major	major	major
major			
outcomes	outcomes	outcome	outcomes
outcomes			
Requirements	Requirements	Requirements	Requirements
Requirements			
analysis	analysis	analysis	analysis
analysis			
phase	phase	phase	phase
phase			
First	First	First	First
First			
we	we	we	we
we			
are	be	are	are
are			
analysing	analyse	analysing	analysing
analysing			
and	and	and	and
and			
refine	refine	refine	refine
refine			
the	the	the	the
the			
requirements	requirements	requirement	requirements
requirements			
of	of	of	of
of			
the	the	the	the
the			
system	system	system	system
system			
In	In	In	In
In			
addition	addition	addition	addition

addition			
Listing	Listing	Listing	Listing
Listing			
the	the	the	the
the			
involved	involve	involved	involved
involved			
operators	operators	operator	operators
operators			
in	in	in	in
in			
the	the	the	the
the			
system	system	system	system
system			
and	and	and	and
and			
identify	identify	identify	identify
identify			
all	all	all	all
all			
the	the	the	the
the			
use	use	use	use
use			
cases	case	case	cases
cases			
and	and	and	and
and			
roles	roles	role	roles
roles			
to	to	to	to
to			
describe	describe	describe	describe
describe			
And	And	And	And
And			
then	then	then	then
then			
to	to	to	to
to			
analyse	analyse	analyse	analyse
analyse			
the	the	the	the
the			
relationship	relationship	relationship	relationship
relationship			
between	between	between	between
between			
the	the	the	the
the			
roles	roles	role	roles
roles			
and	and	and	and
and			
the	the	the	the
the			
cases	case	case	cases
cases			
and	and	and	and
and			

use	use	use	use
use			
UML	UML	UML	UML
UML			
modelling	model	modelling	modelling
modelling			
tool	tool	tool	tool
tool			
to	to	to	to
to			
draw	draw	draw	draw
draw			
the	the	the	the
the			
case	case	case	case
case			
diagram	diagram	diagram	diagram
diagram			
System	System	System	System
System			
analysis	analysis	analysis	analysis
analysis			
and	and	and	and
and			
design	design	design	design
design			
phase	phase	phase	phase
phase			
Identify	Identify	Identify	Identify
Identify			
all	all	all	all
all			
the	the	the	the
the			
needs	need	need	needs
needs			
of	of	of	of
of			
the	the	the	the
the			
system	system	system	system
system			
Abstract	Abstract	Abstract	Abstract
Abstract			
the	the	the	the
the			
classes	class	class	classes
classes			
from	from	from	from
from			
the	the	the	the
the			
actual	actual	actual	actual
actual			
needs	need	need	needs
needs			
and	and	and	and
and			
describe	describe	describe	describe
describe			
the	the	the	the

the relationship relationship between between these these classes classes Extracting Extracting our our attributes attributes actors actors and and classes classes from from analysing analysing our our text text in in the the Natural Natural Language Language Processing Processing with with Python Python ((NLP NLP)) using using NLTK NLTK library library Phase Phase of of system system	relationship between these class Extracting our attribute actors and class from analyse our text in the Natural Language Processing with Python ((NLP) use NLTK library Phase of system	relationship between these class Extracting our attribute actor and class from analysing our text in the Natural Language Processing with Python ((NLP) using NLTK library Phase of system	relationship between these classes Extracting our attributes actors and classes from analysing our text in the Natural Language Processing with Python ((NLP) using NLTK library Phase of system
---	--	---	---

implementation	implementation	implementation	implementation
implementation			
The	The	The	The
The			
model	model	model	model
model			
in	in	in	in
in			
the	the	the	the
the			
first	first	first	first
first			
two	two	two	two
two			
phases	phase	phase	phases
phases			
is	be	is	is
is			
actually	actually	actually	actually
actually			
created	create	created	created
created			
in	in	in	in
in			
a	a	a	a
a			
system	system	system	system
system			
logic	logic	logic	logic
logic			
aspect	aspect	aspect	aspect
aspect			
This	This	This	This
This			
phase	phase	phase	phase
phase			
is	be	is	is
is			
to	to	to	to
to			
accomplish	accomplish	accomplish	accomplish
accomplish			
the	the	the	the
the			
physical	physical	physical	physical
physical			
realization	realization	realization	realization
realization			
of	of	of	of
of			
the	the	the	the
the			
system	system	system	system
system			
such	such	such	such
such			
as	as	a	as
as			
main	main	main	main
main			
classes	class	class	classes

classes			
operators	operators	operator	operators
operators			
or	or	or	or
or			
associations	associations	association	associations
associations			
and	and	and	and
and			
attributes	attribute	attribute	attributes
attributes			
The	The	The	The
The			
library	library	library	library
library			
information	information	information	information
information			
management	management	management	management
management			
system	system	system	system
system			
is	be	is	is
is			
an	an	an	an
an			
electronic	electronic	electronic	electronic
electronic			
archives	archive	archive	archives
archives			
management	management	management	management
management			
system	system	system	system
system			
that	that	that	that
that			
processes	process	process	processes
processes			
a	a	a	a
a			
large	large	large	large
large			
number	number	number	number
number			
of	of	of	of
of			
book	book	book	book
book			
information	information	information	information
information			
using	use	using	using
using			
a	a	a	a
a			
computer	computer	computer	computer
computer			
The	The	The	The
The			
needs	need	need	needs
needs			
of	of	of	of
of			

three	three	three	three
three			
sorts	sort	sort	sorts
sorts			
of	of	of	of
of			
users	users	user	users
users			
must	must	must	must
must			
be	be	be	be
be			
met	meet	met	met
met			
by	by	by	by
by			
this	this	this	this
this			
system	system	system	system
system			
member	member	member	member
member			
librarians	librarians	librarian	librarians
librarians			
author	author	author	author
author			
and	and	and	and
and			
library	library	library	library
library			
((((
(
to	to	to	to
to			
check	check	check	check
check			
for	for	for	for
for			
another	another	another	another
another			
branch	branch	branch	branch
branch			
if	if	if	if
if			
found	find	found	found
found			
))))
)			
Many	Many	Many	Many
Many			
individuals	individuals	individual	individuals
individuals			
can	can	can	can
can			
be	be	be	be
be			
categorized	categorize	categorized	categorized
categorized			
as	as	a	as
as			
user	user	user	user

user			
or	or	or	or
or			
a	a	a	a
a			
librarian	librarian	librarian	librarian
librarian			
based	base	based	based
based			
on	on	on	on
on			
their	their	their	their
their			
status	status	status	status
status			
and	and	and	and
and			
only	only	only	only
only			
one	one	one	one
one			
person	person	person	person
person			
serves	serve	serf	serves
serves			
as	as	a	as
as			
the	the	the	the
the			
system	system	system	system
system			
administrator	administrator	administrator	administrator
administrator			
The	The	The	The
The			
readers	readers	reader	readers
readers			
,	,	,	,
,			
behaviour	behaviour	behaviour	behaviour
behaviour			
is	be	is	is
is			
to	to	to	to
to			
query	query	query	query
query			
the	the	the	the
the			
personal	personal	personal	personal
personal			
information	information	information	information
information			
to	to	to	to
to			
query	query	query	query
query			
the	the	the	the
the			
books	book	book	books
books			

to	to	to	to
to			
book	book	book	book
book			
borrow	borrow	borrow	borrow
borrow			
and	and	and	and
and			
return	return	return	return
return			
them	them	them	them
them			
In	In	In	In
In			
case	case	case	case
case			
of	of	of	of
of			
the	the	the	the
the			
due	due	due	due
due			
date	date	date	date
date			
of	of	of	of
of			
borrowing	borrow	borrowing	borrowing
borrowing			
a	a	a	a
a			
book	book	book	book
book			
has	have	ha	has
has			
passed	pass	passed	passed
passed			
the	the	the	the
the			
member	member	member	member
member			
will	will	will	will
will			
be	be	be	be
be			
obliged	oblige	obliged	obliged
obliged			
to	to	to	to
to			
pay	pay	pay	pay
pay			
a	a	a	a
a			
fine	fine	fine	fine
fine			
A	A	A	A
A			
library	library	library	library
library			
database	database	database	database
database			
must	must	must	must

must			
store	store	store	store
store			
information	information	information	information
information			
about	about	about	about
about			
its	its	it	its
its			
members	members	member	members
members			
librarian	librarian	librarian	librarian
librarian			
and	and	and	and
and			
the	the	the	the
the			
rack	rack	rack	rack
rack			
number	number	number	number
number			
of	of	of	of
of			
the	the	the	the
the			
book	book	book	book
book			
where	where	where	where
where			
it	it	it	it
it			
can	can	can	can
can			
be	be	be	be
be			
found	find	found	found
found			
Each	Each	Each	Each
Each			
book	book	book	book
book			
item	item	item	item
item			
's	's	's	's
's			
status	status	status	status
status			
descriptive	descriptive	descriptive	descriptive
descriptive			
attributes	attribute	attribute	attributes
attributes			
and	and	and	and
and			
cost	cost	cost	cost
cost			
for	for	for	for
for			
losses	losses	loss	losses
losses			
and	and	and	and
and			

late	late	late	late
late			
returns	return	return	returns
returns			
must	must	must	must
must			
be	be	be	be
be			
tracked	track	tracked	tracked
tracked			
by	by	by	by
by			
the	the	the	the
the			
library/librarian	library/librarian	library/librarian	library/librarian
ian library/librarian			
The	The	The	The
The			
ISBN	ISBN	ISBN	ISBN
ISBN			
of	of	of	of
of			
books	book	book	books
books			
will	will	will	will
will			
be	be	be	be
be			
used	use	used	used
used			
to	to	to	to
to			
identify	identify	identify	identify
identify			
them	them	them	them
them			
Each	Each	Each	Each
Each			
book	book	book	book
book			
will	will	will	will
will			
have	have	have	have
have			
a	a	a	a
a			
unique	unique	unique	unique
unique			
ISBN	ISBN	ISBN	ISBN
ISBN			
in	in	in	in
in			
order	order	order	order
order			
to	to	to	to
to			
allow	allow	allow	allow
allow			
multiple	multiple	multiple	multiple
multiple			
copies	copy	copy	copies

copies			
of	of	of	of
of			
the	the	the	the
the			
same	same	same	same
same			
book	book	book	book
book			
For	For	For	For
For			
the	the	the	the
the			
users	users	user	users
users			
to	to	to	to
to			
be	be	be	be
be			
a	a	a	a
a			
member	member	member	member
member			
they	they	they	they
they			
need	need	need	need
need			
to	to	to	to
to			
apply	apply	apply	apply
apply			
for	for	for	for
for			
a	a	a	a
a			
library	library	library	library
library			
card	card	card	card
card			
where	where	where	where
where			
details	detail	detail	details
details			
about	about	about	about
about			
the	the	the	the
the			
member	member	member	member
member			
can	can	can	can
can			
identified	identify	identified	identified
identified			
((((
(
card	card	card	card
card			
number	number	number	number
number			
barcode	barcode	barcode	barcode
barcode			

issue	issue	issue	issue
issue			
date	date	date	date
date			
and	and	and	and
and			
active	active	active	active
active			
status	status	status	status
status			
))))
)			
Furthermore	Furthermore	Furthermore	Furthermore
Furthermore			
when	when	when	when
when			
applying	apply	applying	applying
applying			
for	for	for	for
for			
a	a	a	a
a			
library	library	library	library
library			
card	card	card	card
card			
members	members	member	members
members			
must	must	must	must
must			
create	create	create	create
create			
an	an	an	an
an			
account	account	account	account
account			
then	then	then	then
then			
they	they	they	they
they			
will	will	will	will
will			
be	be	be	be
be			
given	give	given	given
given			
unique	unique	unique	unique
unique			
ID	ID	ID	ID
ID			
their	their	their	their
their			
names	name	name	names
names			
and	and	and	and
and			
password	password	password	password
password			
((((
(
that	that	that	that

that			
can	can	can	can
can			
be	be	be	be
be			
reset	reset	reset	reset
reset			
later	later	later	later
late			
after	after	after	after
after			
account	account	account	account
account			
activation	activation	activation	activation
activation			
by	by	by	by
by			
librarian	librarian	librarian	librarian
librarian			
))))
)			
In	In	In	In
In			
addition	addition	addition	addition
addition			
a	a	a	a
a			
library	library	library	library
library			
card	card	card	card
card			
will	will	will	will
will			
be	be	be	be
be			
required	require	required	required
required			
for	for	for	for
for			
checkout	checkout	checkout	checkout
checkout			
operations	operations	operation	operations
operations			
The	The	The	The
The			
library	library	library	library
library			
card	card	card	card
card			
will	will	will	will
will			
have	have	have	have
have			
its	its	it	its
its			
own	own	own	own
own			
fines	fin	fine	fines
fines			
but	but	but	but
but			

any	any	any	any
any			
outstanding	outstanding	outstanding	outstanding
outstanding			
fin	fin	fine	fines
fines			
on	on	on	on
on			
a	a	a	a
a			
member	member	member	member
member			
,	,	,	,
,			
s	s	s	s
s			
cards	card	card	cards
cards			
will	will	will	will
will			
prevent	prevent	prevent	prevent
prevent			
them	them	them	them
them			
from	from	from	from
from			
using	use	using	using
using			
the	the	the	the
the			
library	library	library	library
library			
's	's	's	's
's			
services	service	service	services
services			
The	The	The	The
The			
system	system	system	system
system			
's	's	's	's
's			
primary	primary	primary	primary
primary			
users	users	user	users
users			
are	be	are	are
are			
librarians	librarians	librarian	librarians
librarians			
They	They	They	They
They			
are	be	are	are
are			
in	in	in	in
in			
charge	charge	charge	charge
charge			
of	of	of	of
of			
day-to-day	day-to-day	day-to-day	day-to-day

day-to-day	management	management	management
management			
management	and	and	and
and			
and	service	service	service
service			
service	operations	operation	operations
operations			
operations	such	such	such
such			
such	as	a	as
as			
as	book	book	book
book			
book	order	ordering	ordering
ordering			
ordering	new	new	new
new			
new	book	book	book
book			
book	verification	verification	verification
verification			
verification	book	book	book
book			
book	registration	registration	registration
registration			
registration	borrow	borrow	borrow
borrow			
borrow	and	and	and
and			
and	return	return	return
return			
return	book	book	books
books			
books	from	from	from
from			
from	members	member	members
members			
members	and	and	and
and			
and	so	so	so
so			
so	on	on	on
on			
on	The	The	The
The			
The	librarians	librarian	librarians
librarians			
librarians	be	are	are
are			
are	also	also	also
also			
also	in	in	in
in			
in	charge	charge	charge
charge			
charge	of	of	of
of			
of	all	all	all
all			
all			

issues	issue	issue	issues
issues			
concerning	concern	concerning	concerning
concerning			
books	book	book	books
books			
including	include	including	including
including			
book	book	book	book
book			
status	status	status	status
status			
((((
(
borrowed	borrow	borrowed	borrowed
borrowed			
not	not	not	not
not			
found	find	found	found
found			
and	and	and	and
and			
etc	etc	etc	etc
etc			
))))
)			
library	library	library	library
library			
management	management	management	management
management			
((((
(
to	to	to	to
to			
check	check	check	check
check			
if	if	if	if
if			
the	the	the	the
the			
book	book	book	book
book			
can	can	can	can
can			
be	be	be	be
be			
found	find	found	found
found			
in	in	in	in
in			
another	another	another	another
another			
branch	branch	branch	branch
branch			
))))
)			
The	The	The	The
The			
key	key	key	key
key			
point	point	point	point

point			
among	among	among	among
among			
them	them	them	them
them			
is	be	is	is
is			
system	system	system	system
system			
maintenance	maintenance	maintenance	maintenance
maintenance			
which	which	which	which
which			
includes	include	includes	includes
includes			
the	the	the	the
the			
maintenance	maintenance	maintenance	maintenance
maintenance			
of	of	of	of
of			
member	member	member	member
member			
rights	right	right	rights
rights			
and	and	and	and
and			
account	account	account	account
account			
details	detail	detail	details
details			
the	the	the	the
the			
creation	creation	creation	creation
creation			
and	and	and	and
and			
activation/deactivationactivation/deactivationactiv			
ation/deactivationactivation/deactivation			
of	of	of	of
of			
members	members	member	members
members			
,	,	,	,
,			
account	account	account	account
account			
fine	fine	fine	fine
fine			
payment	payment	payment	payment
payment			
and	and	and	and
and			
so	so	so	so
so			
on	on	on	on
on			
For	For	For	For
For			
further	further	further	far
further			

elaboration	elaboration	elaboration	elaboration
elaboration			
check	check	check	check
check			
our	our	our	our
our			
Library	Library	Library	Library
Library			
Management	Management	Management	Management
Management			
System	System	System	System
System			
((((
(
Librarian	Librarian	Librarian	Librarian
Librarian			
))))
)			
state	state	state	state
state			
machine	machine	machine	machine
machine			
diagram	diagram	diagram	diagram
diagram			
-	-	-	-
-			
This	This	This	This
This			
diagram	diagram	diagram	diagram
diagram			
depicts	depict	depicts	depicts
depicts			
the	the	the	the
the			
activities	activities	activity	activities
activities			
and	and	and	and
and			
scenarios	scenarios	scenario	scenarios
scenarios			
that	that	that	that
that			
occur	occur	occur	occur
occur			
when	when	when	when
when			
a	a	a	a
a			
member	member	member	member
member			
checks	check	check	checks
checks			
out	out	out	out
out			
a	a	a	a
a			
book	book	book	book
book			
The	The	The	The
The			
actions	action	action	actions

actions			
and	and	and	and
and			
decisions	decisions	decision	decisions
decisions			
were	be	were	were
were			
all	all	all	all
all			
highlighted	highlight	highlighted	highlighted
highlighted			
in	in	in	in
in			
the	the	the	the
the			
state	state	state	state
state			
machine	machine	machine	machine
machine			
diagram	diagram	diagram	diagram
diagram			
see	see	see	see
see			
figure	figure	figure	figure
figure			
2	2	2	2
2			
While	While	While	While
While			
designing	design	designing	designing
designing			
our	our	our	our
our			
Library	Library	Library	Library
Library			
Management	Management	Management	Management
Management			
System	System	System	System
System			
we	we	we	we
we			
will	will	will	will
will			
concentrate	concentrate	concentrate	concentrate
concentrate			
on	on	on	on
on			
the	the	the	the
the			
following	follow	following	following
following			
requirements	requirements	requirement	requirements
requirements			
Books	Books	Books	Books
Books			
should	should	should	should
should			
be	be	be	be
be			
searchable	searchable	searchable	searchable
searchable			

by	by	by	by
by			
title	title	title	title
title			
author	author	author	author
author			
subject	subject	subject	subject
subject			
category	category	category	category
category			
and	and	and	and
and			
publication	publication	publication	publication
publication			
date	date	date	date
date			
for	for	for	for
for			
any	any	any	any
any			
library	library	library	library
library			
member	member	member	member
member			
Each	Each	Each	Each
Each			
book	book	book	book
book			
will	will	will	will
will			
have	have	have	have
have			
a	a	a	a
a			
unique	unique	unique	unique
unique			
identification	identification	identification	identification
identification			
number	number	number	number
number			
as	as	a	as
as			
well	well	well	well
well			
as	as	a	as
as			
other	other	other	other
other			
details	detail	detail	details
details			
such	such	such	such
such			
as	as	a	as
as			
a	a	a	a
a			
rack	rack	rack	rack
rack			
number	number	number	number
number			
that	that	that	that

that			
will	will	will	will
will			
aid	aid	aid	aid
aid			
in	in	in	in
in			
physically	physically	physically	physically
physically			
locating	locate	locating	locating
locating			
the	the	the	the
the			
book	book	book	book
book			
A	A	A	A
A			
book	book	book	book
book			
might	might	might	might
might			
have	have	have	have
have			
multiple	multiple	multiple	multiple
multiple			
copies	copy	copy	copies
copies			
and	and	and	and
and			
library	library	library	library
library			
users	users	user	users
users			
should	should	should	should
should			
be	be	be	be
be			
able	able	able	able
able			
to	to	to	to
to			
borrow	borrow	borrow	borrow
borrow			
and	and	and	and
and			
reserve	reserve	reserve	reserve
reserve			
any	any	any	any
any			
of	of	of	of
of			
them	them	them	them
them			
Each	Each	Each	Each
Each			
copy	copy	copy	copy
copy			
of	of	of	of
of			
a	a	a	a
a			

book	book	book	book
book			
will	will	will	will
will			
be	be	be	be
be			
referred	refer	referred	referred
referred			
to	to	to	to
to			
as	as	a	as
as			
a	a	a	a
a			
book	book	book	book
book			
item	item	item	item
item			
The	The	The	The
The			
system	system	system	system
system			
should	should	should	should
should			
be	be	be	be
be			
able	able	able	able
able			
to	to	to	to
to			
retrieve	retrieve	retrieve	retrieve
retrieve			
information	information	information	information
information			
such	such	such	such
such			
as	as	a	as
as			
who	who	who	who
who			
took	take	took	took
took			
a	a	a	a
a			
specific	specific	specific	specific
specific			
book	book	book	book
book			
or	or	or	or
or			
what	what	what	what
what			
books	book	book	books
books			
are	be	are	are
are			
checked	check	checked	checked
checked			
out	out	out	out
out			



by	by	by	by
by			
a	a	a	a
a			
specific	specific	specific	specific
specific			
library	library	library	library
library			
member	member	member	member
member			
There	There	There	There
There			
should	should	should	should
should			
be	be	be	be
be			
a	a	a	a
a			
maximum	maximum	maximum	maximum
maximum			
limit	limit	limit	limit
limit			
of	of	of	of
of			
5	5	5	5
5			
books	book	book	books
books			
that	that	that	that
that			
a	a	a	a
a			
member	member	member	member
member			
can	can	can	can
can			
check	check	check	check
check			
out	out	out	out
out			
A	A	A	A
A			
member	member	member	member
member			
should	should	should	should
should			
be	be	be	be
be			
allowed	allow	allowed	allowed
allowed			
to	to	to	to
to			
keep	keep	keep	keep
keep			
a	a	a	a
a			
book	book	book	book
book			
for	for	for	for
for			
a	a	a	a

a			
maximum	maximum	maximum	maximum
maximum			
of	of	of	of
of			
10	10	10	10
10			
days	days	day	days
days			
For	For	For	For
For			
books	book	book	books
books			
returned	return	returned	returned
returned			
after	after	after	after
after			
the	the	the	the
the			
due	due	due	due
due			
date	date	date	date
date			
the	the	the	the
the			
user/customer	user/customer	user/customer	user/customer
user/customer			
must	must	must	must
must			
pay	pay	pay	pay
pay			
a	a	a	a
a			
fine	fine	fine	fine
fine			
Members	Members	Members	Members
Members			
should	should	should	should
should			
be	be	be	be
be			
able	able	able	able
able			
to	to	to	to
to			
reserve	reserve	reserve	reserve
reserve			
books	book	book	books
books			
that	that	that	that
that			
are	be	are	are
are			
currently	currently	currently	currently
currently			
unavailable	unavailable	unavailable	unavailable
unavailable			
The	The	The	The
The			
system	system	system	system
system			

should	should	should	should
should			
be	be	be	be
be			
able	able	able	able
able			
to	to	to	to
to			
send	send	send	send
send			
notifications	notifications	notification	notifications
notifications			
when	when	when	when
when			
reserved	reserve	reserved	reserved
reserved			
books	book	book	books
books			
become	become	become	become
become			
available	available	available	available
available			
as	as	a	as
as			
well	well	well	well
well			
as	as	a	as
as			
when	when	when	when
when			
the	the	the	the
the			
book	book	book	book
book			
is	be	is	is
is			
not	not	not	not
not			
returned	return	returned	returned
returned			
by	by	by	by
by			
the	the	the	the
the			
due	due	due	due
due			
date	date	date	date
date			
Each	Each	Each	Each
Each			
book	book	book	book
book			
and	and	and	and
and			
member	member	member	member
member			
will	will	will	will
will			
have	have	have	have
have			
their	their	their	their

their			
own	own	own	own
own			
barcode	barcode	barcode	barcode
barcode			
The	The	The	The
The			
system	system	system	system
system			
will	will	will	will
will			
be	be	be	be
be			
able	able	able	able
able			
to	to	to	to
to			
read	read	read	read
read			
barcodes	barcodes	barcodes	barcodes
barcodes			
from	from	from	from
from			
books	book	book	books
books			
as	as	a	as
as			
well	well	well	well
well			
as	as	a	as
as			
library	library	library	library
library			
cards	card	card	cards
cards			
from	from	from	from
from			
members	members	member	members
members			
In	In	In	In
In			
our	our	our	our
our			
system	system	system	system
system			
there	there	there	there
there			
are	be	are	are
are			
three	three	three	three
three			
main	main	main	main
main			
actors	actors	actor	actors
actors			
Librarians	Librarians	Librarians	Librarians
Librarians			
are	be	are	are
are			
primarily	primarily	primarily	primarily
primarily			

in	in	in	in
in			
charge	charge	charge	charge
charge			
of	of	of	of
of			
adding	add	adding	adding
adding			
and	and	and	and
and			
modifying	modify	modifying	modifying
modifying			
books	book	book	books
books			
book	book	book	book
book			
items	items	item	items
items			
and	and	and	and
and			
users	users	user	users
users			
In	In	In	In
In			
addition	addition	addition	addition
addition			
the	the	the	the
the			
Librarian	Librarian	Librarian	Librarian
Librarian			
can	can	can	can
can			
issue	issue	issue	issue
issue			
reserve	reserve	reserve	reserve
reserve			
and	and	and	and
and			
return	return	return	return
return			
book	book	book	book
book			
items	items	item	items
items			
Member	Member	Member	Member
Member			
All	All	All	All
All			
members	members	member	members
members			
have	have	have	have
have			
access	access	access	access
access			
to	to	to	to
to			
the	the	the	the
the			
catalogue	catalogue	catalogue	catalogue
catalogue			
and	and	and	and

and	can	can	can
can			
can			
check	check	check	check
check			
out	out	out	out
out			
reserve	reserve	reserve	reserve
reserve			
renew	renew	renew	renew
renew			
and	and	and	and
and			
return	return	return	return
return			
books	book	book	books
books			
System	System	System	System
System			
Is	Is	Is	Is
Is			
primarily	primarily	primarily	primarily
primarily			
in	in	in	in
in			
charge	charge	charge	charge
charge			
of	of	of	of
of			
sending	send	sending	sending
sending			
notifications	notifications	notification	notifications
notifications			
for	for	for	for
for			
overdue	overdue	overdue	overdue
overdue			
books	book	book	books
books			
cancelled	cancel	cancelled	cancelled
cancelled			
reservations	reservations	reservation	reservations
reservations			
and	and	and	and
and			
so	so	so	so
so			
on	on	on	on
on			
Our	Our	Our	Our
Our			
Library	Library	Library	Library
Library			
Management	Management	Management	Management
Management			
System	System	System	System
System			
is	be	is	is
is			
divided	divide	divided	divided
divided			

into	into	into	into
into			
the	the	the	the
the			
following	follow	following	following
following			
classes	class	class	classes
classes			
Library	Library	Library	Library
Library			
The	The	The	The
The			
heart	heart	heart	heart
heart			
of	of	of	of
of			
the	the	the	the
the			
organization	organization	organization	organization
organization			
for	for	for	for
for			
which	which	which	which
which			
this	this	this	this
this			
software	software	software	software
software			
was	be	wa	was
was			
created	create	created	created
created			
It	It	It	It
It			
has	have	ha	has
has			
attributes	attribute	attribute	attributes
attributes			
such	such	such	such
such			
as	as	a	as
as			
'Name	'Name	'Name	'Name
'Name	,	,	,
,			
,			
to	to	to	to
to			
differentiate	differentiate	differentiate	differentiate
differentiate			
it	it	it	it
it			
from	from	from	from
from			
other	other	other	other
other			
libraries	libraries	library	libraries
libraries			
and	and	and	and
and			
'Address	'Address	'Address	'Address

'Address	,	,	,
,			
,			
to	to	to	to
to			
describe	describe	describe	describe
describe			
its	its	it	its
its			
location	location	location	location
location			
the	the	the	the
the			
class	class	class	class
class			
should	should	should	should
should			
be	be	be	be
be			
able	able	able	able
able			
to	to	to	to
to			
identify	identify	identify	identify
identify			
in	in	in	in
in			
which	which	which	which
which			
branch	branch	branch	branch
branch			
is	be	is	is
is			
the	the	the	the
the			
book	book	book	book
book			
located	locate	located	located
located			
Book	Book	Book	Book
Book			
The	The	The	The
The			
system	system	system	system
system			
's	's	's	's
's			
fundamental	fundamental	fundamental	fundamental
fundamental			
building	build	building	building
building			
block	block	block	block
block			
Every	Every	Every	Every
Every			
book	book	book	book
book			
will	will	will	will
will			
have	have	have	have
have			

an	an	an	an
an			
ISBN	ISBN	ISBN	ISBN
ISBN			
a	a	a	a
a			
title	title	title	title
title			
and	and	and	and
and			
subject	subject	subject	subject
subject			
Book	Book	Book	Book
Book			
Item	Item	Item	Item
Item			
Any	Any	Any	Any
Any			
book	book	book	book
book			
can	can	can	can
can			
have	have	have	have
have			
multiple	multiple	multiple	multiple
multiple			
copies	copy	copy	copies
copies			
and	and	and	and
and			
each	each	each	each
each			
copy	copy	copy	copy
copy			
is	be	is	is
is			
treated	treat	treated	treated
treated			
as	as	a	as
as			
a	a	a	a
a			
book	book	book	book
book			
item	item	item	item
item			
in	in	in	in
in			
our	our	our	our
our			
system	system	system	system
system			
Each	Each	Each	Each
Each			
book	book	book	book
book			
will	will	will	will
will			
have	have	have	have
have			
its	its	it	its

its			
own	own	own	own
own			
barcode	barcode	barcode	barcode
barcode			
In	In	In	In
In			
addition	addition	addition	addition
addition			
giving	give	giving	giving
giving			
information	information	information	information
information			
if	if	if	if
if			
the	the	the	the
the			
book	book	book	book
book			
is	be	is	is
is			
borrowed	borrow	borrowed	borrowed
borrowed			
and	and	and	and
and			
when	when	when	when
when			
it	it	it	it
it			
should	should	should	should
should			
be	be	be	be
be			
returned	return	returned	returned
returned			
by	by	by	by
by			
the	the	the	the
the			
members	members	member	members
members			
,	,	,	,
,			
user	user	user	user
user			
Information	Information	Information	Information
Information			
also	also	also	also
also			
about	about	about	about
about			
the	the	the	the
the			
publication	publication	publication	publication
publication			
date	date	date	date
date			
of	of	of	of
of			
the	the	the	the
the			

book	book	book	book
book			
and	and	and	and
and			
date	date	date	date
date			
of	of	of	of
of			
purchase	purchase	purchase	purchase
purchase			
if	if	if	if
if			
the	the	the	the
the			
member	member	member	member
member			
bought	buy	bought	bought
bought			
it	it	it	it
it			
As	As	As	As
As			
an	an	an	an
an			
operation	operation	operation	operation
operation			
process	process	process	process
process			
librarian	librarian	librarian	librarian
librarian			
should	should	should	should
should			
be	be	be	be
be			
able	able	able	able
able			
to	to	to	to
to			
check	check	check	check
check			
out	out	out	out
out			
the	the	the	the
the			
book	book	book	book
book			
Account	Account	Account	Account
Account			
There	There	There	There
There			
will	will	will	will
will			
be	be	be	be
be			
two	two	two	two
two			
types	type	type	types
types			
of	of	of	of
of			
accounts	account	account	accounts

accounts			
in	in	in	in
in			
the	the	the	the
the			
system	system	system	system
system			
one	one	one	one
one			
for	for	for	for
for			
general	general	general	general
general			
members	members	member	members
members			
and	and	and	and
and			
one	one	one	one
one			
for	for	for	for
for			
librarians	librarians	librarian	librarians
librarians			
where	where	where	where
where			
every	every	every	every
every			
class	class	class	class
class			
will	will	will	will
will			
have	have	have	have
have			
its	its	it	its
its			
own	own	own	own
own			
id	id	id	id
id			
password	password	password	password
password			
and	and	and	and
and			
username	username	username	username
username			
Member	Member	Member	Member
Member			
or	or	or	or
or			
librarian	librarian	librarian	librarian
librarian			
should	should	should	should
should			
be	be	be	be
be			
able	able	able	able
able			
to	to	to	to
to			
reset	reset	reset	reset
reset			

their	their	their	their
their			
passwords	passwords	password	passwords
passwords			
Library	Library	Library	Library
Library			
Card	Card	Card	Card
Card			
A	A	A	A
A			
library	library	library	library
library			
card	card	card	card
card			
will	will	will	will
will			
be	be	be	be
be			
issued	issue	issued	issued
issued			
to	to	to	to
to			
each	each	each	each
each			
library	library	library	library
library			
user	user	user	user
user			
which	which	which	which
which			
will	will	will	will
will			
be	be	be	be
be			
used	use	used	used
used			
to	to	to	to
to			
identify	identify	identify	identify
identify			
users	users	user	users
users			
when	when	when	when
when			
issuing	issue	issuing	issuing
issuing			
or	or	or	or
or			
returning	return	returning	returning
returning			
books	book	book	books
books			
Where	Where	Where	Where
Where			
there	there	there	there
there			
will	will	will	will
will			
be	be	be	be
be			
a	a	a	a

a			
unidirectional	unidirectional	unidirectional	unidirectional
unidirectional			
association	association	association	association
association			
with	with	with	with
with			
the	the	the	the
the			
Account	Account	Account	Account
Account			
details	detail	detail	details
details			
Additionally	Additionally	Additionally	Additionally
Additionally			
it	it	it	it
it			
should	should	should	should
should			
hold	hold	hold	hold
hold			
information	information	information	information
information			
like	like	like	like
like			
card	card	card	card
card			
number	number	number	number
number			
barcode	barcode	barcode	barcode
barcode			
issue	issue	issue	issue
issue			
date	date	date	date
date			
and	and	and	and
and			
account	account	account	account
account			
status	status	status	status
status			
Book	Book	Book	Book
Book			
Reservation	Reservation	Reservation	Reservation
Reservation			
In	In	In	In
In			
charge	charge	charge	charge
charge			
of	of	of	of
of			
managing	manage	managing	managing
managing			
reservations	reservations	reservation	reservations
reservations			
for	for	for	for
for			
book	book	book	book
book			
items	items	item	items
items			

based	base	based	based
based			
on	on	on	on
on			
the	the	the	the
the			
creation	creation	creation	creation
creation			
date	date	date	date
date			
and	and	and	and
and			
status	status	status	status
status			
If	If	If	If
If			
the	the	the	the
the			
account	account	account	account
account			
is	be	is	is
is			
active	active	active	active
active			
book	book	book	book
book			
reservation	reservation	reservation	reservation
reservation			
can	can	can	can
can			
be	be	be	be
be			
confirmed	confirm	confirmed	confirmed
confirmed			
Book	Book	Book	Book
Book			
Lending	Lending	Lending	Lending
Lending			
Manage	Manage	Manage	Manage
Manage			
the	the	the	the
the			
loaning	loan	loaning	loaning
loaning			
of	of	of	of
of			
books	book	book	books
books			
Due	Due	Due	Due
Due			
date	date	date	date
date			
&	&	&	&
&			
return	return	return	return
return			
date	date	date	date
date			
should	should	should	should
should			
be	be	be	be

be			
known	know	known	known
known			
Catalogue	Catalogue	Catalogue	Catalogue
Catalogue			
A	A	A	A
A			
list	list	list	list
list			
of	of	of	of
of			
books	book	book	books
books			
sorted	sort	sorted	sorted
sorted			
according	accord	according	according
according			
to	to	to	to
to			
certain	certain	certain	certain
certain			
criteria	criteria	criterion	criteria
criteria			
Our	Our	Our	Our
Our			
system	system	system	system
system			
will	will	will	will
will			
allow	allow	allow	allow
allow			
you	you	you	you
you			
to	to	to	to
to			
search	search	search	search
search			
four	four	four	four
four			
catalogues	catalogue	catalogue	catalogues
catalogues			
by	by	by	by
by			
title	title	title	title
title			
author	author	author	author
author			
subject	subject	subject	subject
subject			
and	and	and	and
and			
publish	publish	publish	publish
publish			
date	date	date	date
date			
Fines	Fines	Fines	Fines
Fines			
in	in	in	in
in			
case	case	case	case
case			

the	the	the	the
the			
lend	lend	lend	lend
lend			
book	book	book	book
book			
is	be	is	is
is			
not	not	not	not
not			
returned	return	returned	returned
returned			
by	by	by	by
by			
the	the	the	the
the			
due	due	due	due
due			
date	date	date	date
date			
specified	specify	specified	specified
specified			
in	in	in	in
in			
the	the	the	the
the			
Book	Book	Book	Book
Book			
Lending	Lending	Lending	Lending
Lending			
class	class	class	class
class			
This	This	This	This
This			
class	class	class	class
class			
will	will	will	will
will			
be	be	be	be
be			
in	in	in	in
in			
charge	charge	charge	charge
charge			
of	of	of	of
of			
calculating	calculate	calculating	calculating
calculating			
and	and	and	and
and			
collecting	collect	collecting	collecting
collecting			
fin	fin	fine	fines
fines			
from	from	from	from
from			
library	library	library	library
library			
patrons	patrons	patron	patrons
patrons			
Bill	Bill	Bill	Bill

Bill			
this	this	this	this
this			
class	class	class	class
class			
will	will	will	will
will			
be	be	be	be
be			
referred	refer	referred	referred
referred			
from	from	from	from
from			
the	the	the	the
the			
transaction	transaction	transaction	transaction
transaction			
to	to	to	to
to			
be	be	be	be
be			
paid	pay	paid	paid
paid			
by	by	by	by
by			
the	the	the	the
the			
member	member	member	member
member			
And	And	And	And
And			
librarian	librarian	librarian	librarian
librarian			
will	will	will	will
will			
be	be	be	be
be			
able	able	able	able
able			
to	to	to	to
to			
create	create	create	create
create			
issue	issue	issue	issue
issue			
and	and	and	and
and			
update	update	update	update
update			
bill	bill	bill	bill
bill			
Author	Author	Author	Author
Author			
This	This	This	This
This			
class	class	class	class
class			
will	will	will	will
will			
focus	focus	focus	focus
focus			

on	on	on	on
on			
the	the	the	the
the			
author	author	author	author
author			
of	of	of	of
of			
a	a	a	a
a			
book	book	book	book
book			
storing	store	storing	storing
storing			
name	name	name	name
name			
of	of	of	of
of			
the	the	the	the
the			
book	book	book	book
book			
and	and	and	and
and			
a	a	a	a
a			
brief	brief	brief	brief
brief			
description	description	description	description
description			
Rack	Rack	Rack	Rack
Rack			
Books	Books	Books	Books
Books			
will	will	will	will
will			
be	be	be	be
be			
arranged	arrange	arranged	arranged
arranged			
on	on	on	on
on			
shelves	shelve	shelf	shelves
shelves			
Each	Each	Each	Each
Each			
rack	rack	rack	rack
rack			
will	will	will	will
will			
be	be	be	be
be			
identified	identify	identified	identified
identified			
by	by	by	by
by			
a	a	a	a
a			
rack	rack	rack	rack
rack			
number	number	number	number

number			
and	and	and	and
and			
a	a	a	a
a			
location	location	location	location
location			
identifier	identifier	identifier	identifier
identifier			
that	that	that	that
that			
describes	describe	describes	describes
describes			
the	the	the	the
the			
rack	rack	rack	rack
rack			
's	's	's	's
's			
physical	physical	physical	physical
physical			
location	location	location	location
location			
in	in	in	in
in			
the	the	the	the
the			
library	library	library	library
library			
Notification	Notification	Notification	Notification
Notification			
This	This	This	This
This			
class	class	class	class
class			
will	will	will	will
will			
handle	handle	handle	handle
handle			
sending	send	sending	sending
sending			
notifications	notifications	notification	notifications
notifications			
to	to	to	to
to			
library	library	library	library
library			
users	users	user	users
users			
to	to	to	to
to			
their	their	their	their
their			
email	email	email	email
email			
addresses	address	address	addresses
addresses			

In [10]:



```
# C L A S S      N A M E S      S L O V N I K
i = 1

nndict = {}
for i in range(len(tagged)):
    syn = 1
    selectedtag = tagged[i]
    selectedtyp = selectedtag[1]
    selectedtoken = selectedtag[0]
    if (selectedtyp == 'NN' or selectedtyp == 'NNP' or selectedtyp == 'NNS' or selectedtyp
        if (selectedtoken == 'system'):
            selectedtoken = (tagged[i-1][0] + ' system')
            #print (selectedtoken, "system")
        if (selectedtoken in nndict):
            syn = nndict[selectedtoken] + 1
        nndict[selectedtoken] = syn
print('nndict: ',nndict)

for klic, hodnota in nndict.items():
    print('{}: {}'.format(klic, hodnota))
```

```
nndict: {'cases': 4, 'analysis': 4, 'the system': 8, 'function': 1, 'inte
rface': 1, 'users': 8, 'comprehend system': 1, 'functionality': 1, 'develo
pers': 1, 'requirements': 5, 'task': 1, 'identify system': 1, 'use': 3, 'c
reate system': 1, 'case': 4, 'diagram': 7, 'state': 3, 'machine': 3, 'sequ
ence': 1, 'outcomes': 1, 'Requirements': 1, 'phase': 3, 'First': 1, 'addit
ion': 4, 'operators': 2, 'roles': 2, 'relationship': 2, 'UML': 1, 'tool':
1, 'System': 5, 'design': 1, 'Identify': 1, 'needs': 3, 'Abstract': 1, 'cl
asses': 5, 'attributes': 3, 'actors': 2, 'text': 1, 'Natural': 1, 'Languag
e': 1, 'Python': 1, 'NLP': 1, 'NLTK': 1, 'Phase': 1, 'of system': 1, 'impl
ementation': 1, 'model': 1, 'phases': 1, 'in system': 1, 'aspect': 1, 'rea
lization': 1, 'associations': 1, 'information': 7, 'management': 4, 'manag
ement system': 2, 'archives': 1, 'number': 7, 'book': 37, 'computer': 1,
'sorts': 1, 'this system': 1, 'member': 14, 'author': 4, 'library': 4, 'br
anch': 3, 'individuals': 1, 'user': 2, 'status': 6, 'person': 1, 'reader
s': 1, 'books': 16, 'borrow': 2, 'date': 13, 'database': 1, 'members': 8,
'rack': 5, 'item': 3, 'cost': 1, 'losses': 1, 'returns': 1, 'ISBN': 3, 'or
der': 1, 'copies': 3, 'card': 6, 'details': 4, 'issue': 3, 'Furthermore':
1, 'account': 5, 'ID': 1, 'names': 1, 'password': 2, 'activation': 1, 'che
ckout': 1, 'operations': 2, 'fines': 3, 's': 1, 'cards': 2, 'services': 1,
'The system': 5, 'charge': 6, 'service': 1, 'verification': 1, 'registrati
on': 1, 'librarians': 2, 'issues': 1, 'point': 1, 'is system': 1, 'mainten
ance': 2, 'rights': 1, 'creation': 2, 'activation/deactivation': 1, 'payme
nt': 1, 'elaboration': 1, 'Library': 4, 'Management': 3, '-': 1, 'activiti
es': 1, 'scenarios': 1, 'actions': 1, 'decisions': 1, 'figure': 1, 'Book
s': 2, 'title': 3, 'category': 1, 'publication': 2, 'identification': 1,
'copy': 2, 'limit': 1, 'maximum': 1, 'days': 1, 'Members': 1, 'notificatio
ns': 3, 'barcode': 2, 'barcodes': 1, 'our system': 2, 'Librarians': 1, 'it
ems': 3, 'reserve': 2, 'Member': 2, 'All': 1, 'access': 1, 'catalogue': 1,
'renew': 1, 'reservations': 2, 'heart': 1, 'organization': 1, 'software':
1, "Name": 1, 'libraries': 1, "Address": 1, 'location': 3, 'class': 7,
'Book': 5, 'building': 1, 'block': 1, 'Every': 1, 'Item': 1, 'Any': 1, 'In
formation': 1, 'purchase': 1, 'operation': 1, 'process': 1, 'librarian':
2, 'Account': 2, 'types': 1, 'accounts': 1, 'id': 1, 'passwords': 1, 'Car
d': 1, 'A': 2, 'association': 1, 'Reservation': 1, 'reservation': 1, 'Lend
ing': 2, 'Manage': 1, 'loaning': 1, 'Due': 1, 'return': 1, 'Catalogue': 1,
'list': 1, 'criteria': 1, 'Our system': 1, 'catalogues': 1, 'subject': 1,
'Fines': 1, 'lend': 1, 'patrons': 1, 'transaction': 1, 'bill': 1, 'Autho
```

r': 1, 'name': 1, 'description': 1, 'Rack': 1, 'shelves': 1, 'identifier':
1, 'Notification': 1, 'email': 1, 'addresses': 1}
cases: 4
analysis: 4
the system: 8
function: 1
interface: 1
users: 8
comprehend system: 1
functionality: 1
developers: 1
requirements: 5
task: 1
identify system: 1
use: 3
create system: 1
case: 4
diagram: 7
state: 3
machine: 3
sequence: 1
outcomes: 1
Requirements: 1
phase: 3
First: 1
addition: 4
operators: 2
roles: 2
relationship: 2
UML: 1
tool: 1
System: 5
design: 1
Identify: 1
needs: 3
Abstract: 1
classes: 5
attributes: 3
actors: 2
text: 1
Natural: 1
Language: 1
Python: 1
NLP: 1
NLTK: 1
Phase: 1
of system: 1
implementation: 1
model: 1
phases: 1
in system: 1
aspect: 1
realization: 1
associations: 1
information: 7
management: 4
management system: 2
archives: 1
number: 7
book: 37
computer: 1

sorts: 1
this system: 1
member: 14
author: 4
library: 4
branch: 3
individuals: 1
user: 2
status: 6
person: 1
readers: 1
books: 16
borrow: 2
date: 13
database: 1
members: 8
rack: 5
item: 3
cost: 1
losses: 1
returns: 1
ISBN: 3
order: 1
copies: 3
card: 6
details: 4
issue: 3
Furthermore: 1
account: 5
ID: 1
names: 1
password: 2
activation: 1
checkout: 1
operations: 2
fines: 3
s: 1
cards: 2
services: 1
The system: 5
charge: 6
service: 1
verification: 1
registration: 1
librarians: 2
issues: 1
point: 1
is system: 1
maintenance: 2
rights: 1
creation: 2
activation/deactivation: 1
payment: 1
elaboration: 1
Library: 4
Management: 3
-: 1
activities: 1
scenarios: 1
actions: 1
decisions: 1

figure: 1
Books: 2
title: 3
category: 1
publication: 2
identification: 1
copy: 2
limit: 1
maximum: 1
days: 1
Members: 1
notifications: 3
barcode: 2
barcodes: 1
our system: 2
Librarians: 1
items: 3
reserve: 2
Member: 2
All: 1
access: 1
catalogue: 1
renew: 1
reservations: 2
heart: 1
organization: 1
software: 1
'Name: 1
libraries: 1
'Address: 1
location: 3
class: 7
Book: 5
building: 1
block: 1
Every: 1
Item: 1
Any: 1
Information: 1
purchase: 1
operation: 1
process: 1
librarian: 2
Account: 2
types: 1
accounts: 1
id: 1
passwords: 1
Card: 1
A: 2
association: 1
Reservation: 1
reservation: 1
Lending: 2
Manage: 1
loaning: 1
Due: 1
return: 1
Catalogue: 1
list: 1
criteria: 1

Our system: 1
catalogues: 1
subject: 1
Fines: 1
lend: 1
patrons: 1
transaction: 1
bill: 1
Author: 1
name: 1
description: 1
Rack: 1
shelves: 1
identifier: 1
Notification: 1
email: 1
addresses: 1



In [11]:



```
## ASSOCIATIONS or OPERATIONS SLOVNIK
i = 1

vbdict = {}
for i in range(len(tagged)):
    syn = 1
    selectedtag = tagged[i]
    selectedtyp = selectedtag[1]
    selectedtoken = selectedtag[0]
    if (selectedtyp == 'VB' or selectedtyp == 'BD' or selectedtyp == 'VBN' or selectedtyp == 'VBD'):
        if (selectedtoken == 'system'):
            selectedtoken = (tagged[i-1][0] + ' system')
            #print(selectedtoken, "system")
        if (selectedtoken in vbdict):
            syn = vbdict[selectedtoken] + 1
        vbdict[selectedtoken] = syn
print('vbdict: ', vbdict)

for klic, hodnota in vbdict.items():
    print('{}: {}'.format(klic, hodnota))
```

```
vbdict: {'performed': 1, 'determine': 1, 'comprehend': 1, 'understand': 1, 'identify': 5, 'analysing': 2, 'refine': 1, 'Listing': 1, 'describe': 3, 'analyse': 1, 'use': 1, 'modelling': 1, 'draw': 1, 'Extracting': 1, 'Processing': 1, 'using': 3, 'created': 2, 'accomplish': 1, 'be': 36, 'met': 1, 'check': 6, 'found': 4, 'categorized': 1, 'based': 2, 'query': 2, 'return': 4, 'borrowing': 1, 'passed': 1, 'obliged': 1, 'pay': 2, 'fine': 1, 'store': 1, 'tracked': 1, 'used': 2, 'have': 9, 'allow': 2, 'apply': 1, 'identified': 2, 'applying': 1, 'create': 2, 'given': 1, 'reset': 2, 'required': 1, 'prevent': 1, 'ordering': 1, 'concerning': 1, 'including': 1, 'highlighted': 1, 'designing': 1, 'concentrate': 1, 'aid': 1, 'locating': 1, 'borrow': 1, 'reserve': 2, 'referred': 2, 'retrieve': 1, 'checked': 1, 'allowed': 1, 'keep': 1, 'returned': 4, 'send': 1, 'reserved': 1, 'become': 1, 'read': 1, 'adding': 1, 'modifying': 1, 'issue': 1, 'sending': 2, 'divided': 1, 'differentiate': 1, 'located': 1, 'treated': 1, 'giving': 1, 'borrowed': 1, 'issued': 1, 'issuing': 1, 'returning': 1, 'hold': 1, 'managing': 1, 'confirmed': 1, 'known': 1, 'sorted': 1, 'according': 1, 'search': 1, 'specified': 1, 'calculating': 1, 'collecting': 1, 'paid': 1, 'focus': 1, 'storing': 1, 'arranged': 1, 'handle': 1}
performed: 1
determine: 1
comprehend: 1
understand: 1
identify: 5
analysing: 2
refine: 1
Listing: 1
describe: 3
analyse: 1
use: 1
modelling: 1
draw: 1
Extracting: 1
Processing: 1
using: 3
created: 2
accomplish: 1
be: 36
```

met: 1
check: 6
found: 4
categorized: 1
based: 2
query: 2
return: 4
borrowing: 1
passed: 1
obliged: 1
pay: 2
fine: 1
store: 1
tracked: 1
used: 2
have: 9
allow: 2
apply: 1
identified: 2
applying: 1
create: 2
given: 1
reset: 2
required: 1
prevent: 1
ordering: 1
concerning: 1
including: 1
highlighted: 1
designing: 1
concentrate: 1
aid: 1
locating: 1
borrow: 1
reserve: 2
referred: 2
retrieve: 1
checked: 1
allowed: 1
keep: 1
returned: 4
send: 1
reserved: 1
become: 1
read: 1
adding: 1
modifying: 1
issue: 1
sending: 2
divided: 1
differentiate: 1
located: 1
treated: 1
giving: 1
borrowed: 1
issued: 1
issuing: 1
returning: 1
hold: 1
managing: 1
confirmed: 1

known: 1
sorted: 1
according: 1
search: 1
specified: 1
calculating: 1
collecting: 1
paid: 1
focus: 1
storing: 1
arranged: 1
handle: 1



In [12]:



```
# A T T R I B U T S   N A M E S   S L O V N I K

adjdict = {}
for i in range(len(tagged)):
    syn = 1
    selectedtag = tagged[i]
    selectedtyp = selectedtag[1]
    selectedtoken = selectedtag[0]
    if (selectedtyp == 'JJ' or selectedtyp == 'CD'):
        if (selectedtoken == 'system'):
            selectedtoken = (tagged[i-1][0] + ' system')
            #print (selectedtoken, "system")
        if (selectedtoken in adjdict):
            syn = adjdict[selectedtoken] + 1
        adjdict[selectedtoken] = syn
print('adjdict: ',adjdict)

for klic, hodnota in adjdict.items():
    print('{}: {}'.format(klic, hodnota))
```

```
adjdict: {'requirement': 1, 'user': 1, 'principal': 1, 'major': 1, 'involved': 1, 'actual': 1, 'library': 15, 'first': 1, 'two': 2, 'logic': 1, 'physical': 2, 'such': 5, 'main': 2, 'electronic': 1, 'large': 1, 'three': 2, 'Many': 1, 'librarian': 4, 'one': 3, 'personal': 1, 'due': 4, 'descriptive': 1, 'late': 1, 'library/librarian': 1, 'unique': 3, 'multiple': 3, 'same': 1, 'card': 1, 'barcode': 2, 'active': 2, 'own': 4, 'outstanding': 1, 'primary': 1, 'day-to-day': 1, 'new': 1, 'etc': 1, 'key': 1, 'fine': 2, 'further': 1, 'Librarian': 2, '2': 1, 'following': 2, 'searchable': 1, 'subject': 2, 'other': 2, 'able': 9, 'specific': 2, 'maximum': 1, '5': 1, '10': 1, 'user/customer': 1, 'unavailable': 1, 'available': 1, 'overdue': 1, 'fundamental': 1, 'general': 1, 'username': 1, 'unidirectional': 1, 'certain': 1, 'four': 1, 'publish': 1, 'update': 1, 'brief': 1}
requirement: 1
user: 1
principal: 1
major: 1
involved: 1
actual: 1
library: 15
first: 1
two: 2
logic: 1
physical: 2
such: 5
main: 2
electronic: 1
large: 1
three: 2
Many: 1
librarian: 4
one: 3
personal: 1
due: 4
descriptive: 1
late: 1
library/librarian: 1
unique: 3
multiple: 3
```

same: 1
card: 1
barcode: 2
active: 2
own: 4
outstanding: 1
primary: 1
day-to-day: 1
new: 1
etc: 1
key: 1
fine: 2
further: 1
Librarian: 2
2: 1
following: 2
searchable: 1
subject: 2
other: 2
able: 9
specific: 2
maximum: 1
5: 1
10: 1
user/customer: 1
unavailable: 1
available: 1
overdue: 1
fundamental: 1
general: 1
username: 1
unidirectional: 1
certain: 1
four: 1
publish: 1
update: 1
brief: 1

