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TRANSFORM

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xGitGuard: ML-Based Secret Scanner for GitHub

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Overview

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Existing Approaches

- **TruffleHog**[1]
  - Detect high-entropy text
- **Gitguardian**[1]
  - Detects secrets using Regex classifiers
- **EarlyBird**
  - Detects specific patterns in files
- **NightWatch**
  - Entropy-based detection

Limitations with existing works:

- User decides the repos
- Regex-based detection
- Relying on entropy
- Exclusively cover API keys
- Scalability

1. S. Lounici, "Optimizing Leak Detection in Open-source Platforms with Machine Learning Techniques," in 7th International Conference on Information Systems Security and Privacy, Vienna, Austria, 2021.

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xGitGuard

Introduction

xGitGuard

DETECT EXPOSED SECRETS

GITHUB

AI ENGINE

ACCURATE & SCALABLE

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What Secrets?

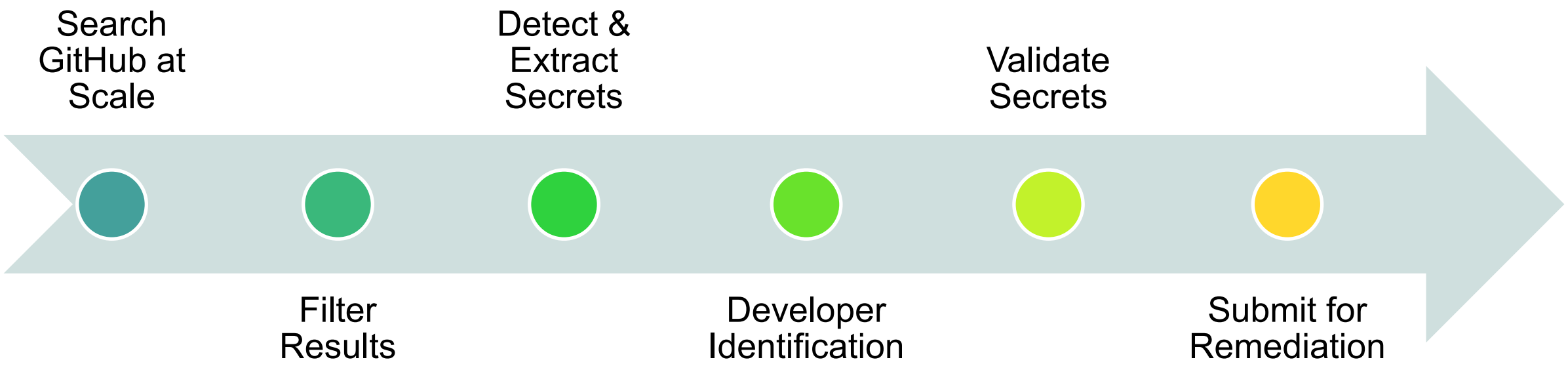
CREDENTIALS

- Username & passwords
- Server credentials
- Account credentials

TOKENS / KEYS

- Service API tokens (AWS, Azure, etc)
- Encryption keys

Workflow


Search GitHub at Scale
Filter Results
Detect & Extract Secrets
Developer Identification
Validate Secrets
Submit for Remediation

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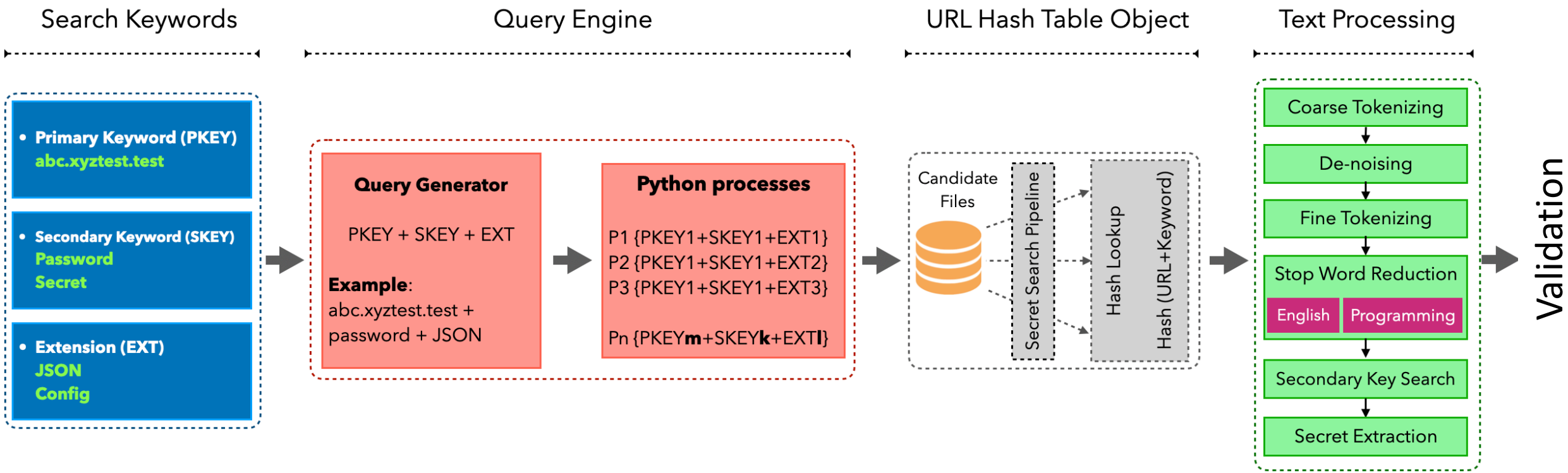
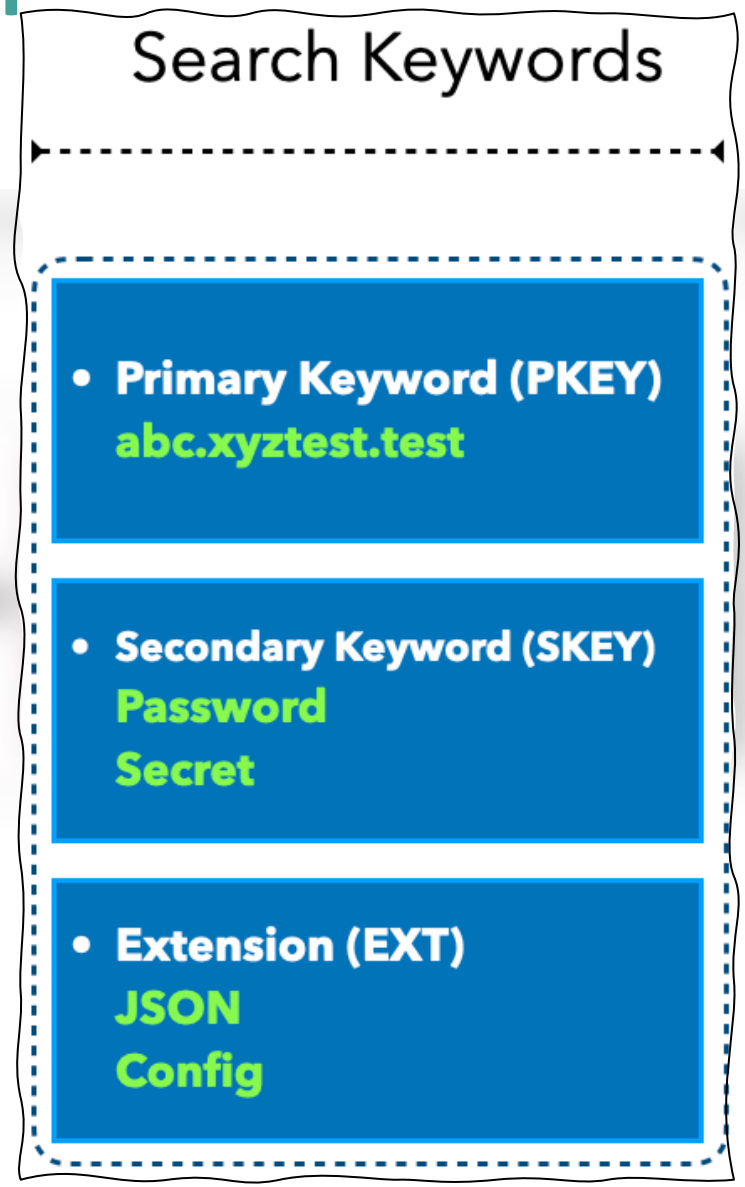
Architecture

Main components

Credential Detection



Credential Detection



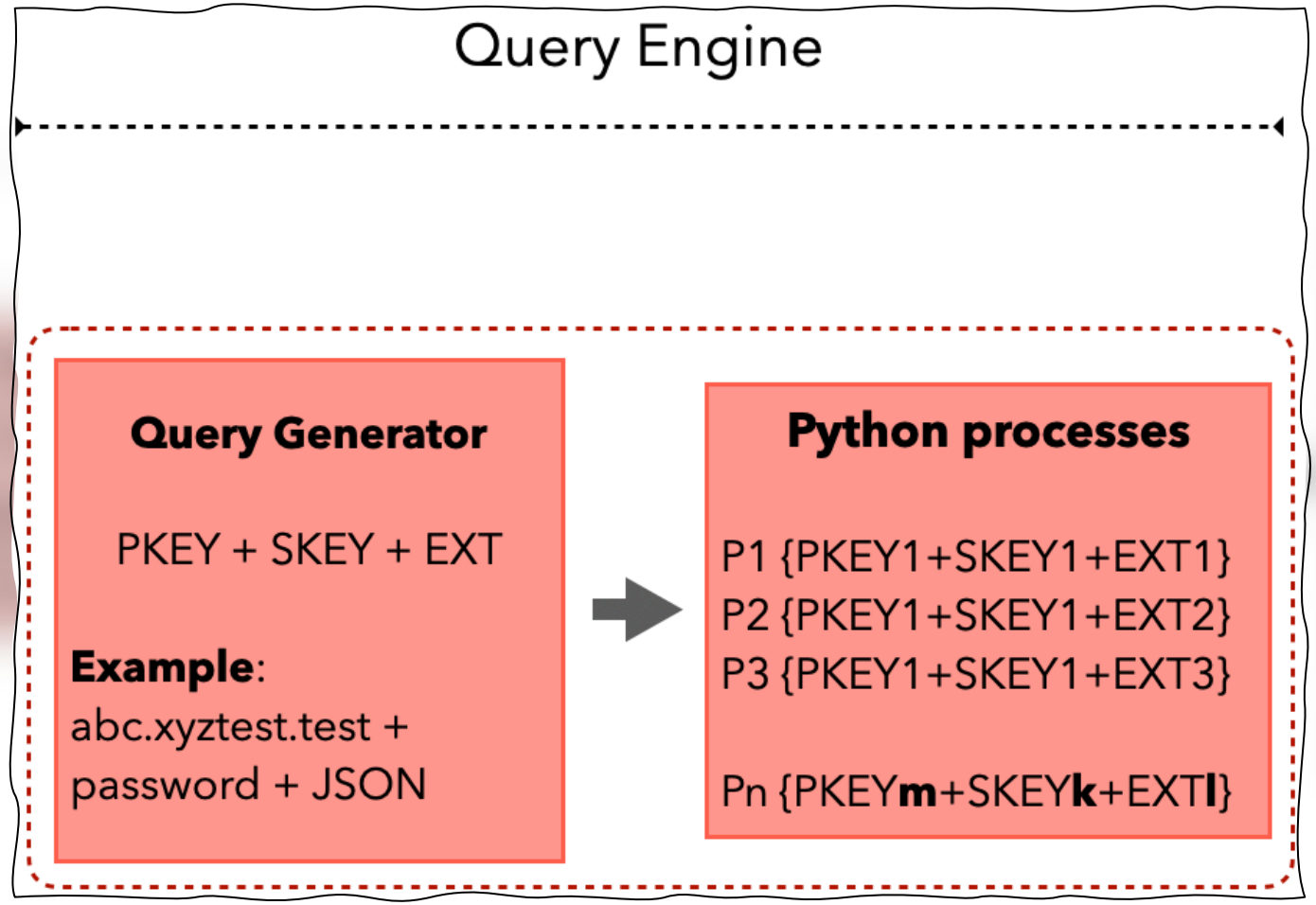
Credential Detection

```
19  Copyright 2021 abc.xyztest.test
20  import os
21  import sys
22
23  import numpy as np
24  from sklearn.feature_extraction.text import CountVectorizer
25
26  MODULE_DIR = os.path.dirname(os.path.realpath(__file__))
27  parent_dir = os.path.dirname(MODULE_DIR)
28  sys.path.append(parent_dir)
29
30  from utilities.file_utilities import read_yaml_file, read_csv_file
31  password = “abcd123”
32
33  logger = logging.getLogger("xgg_logger")
```

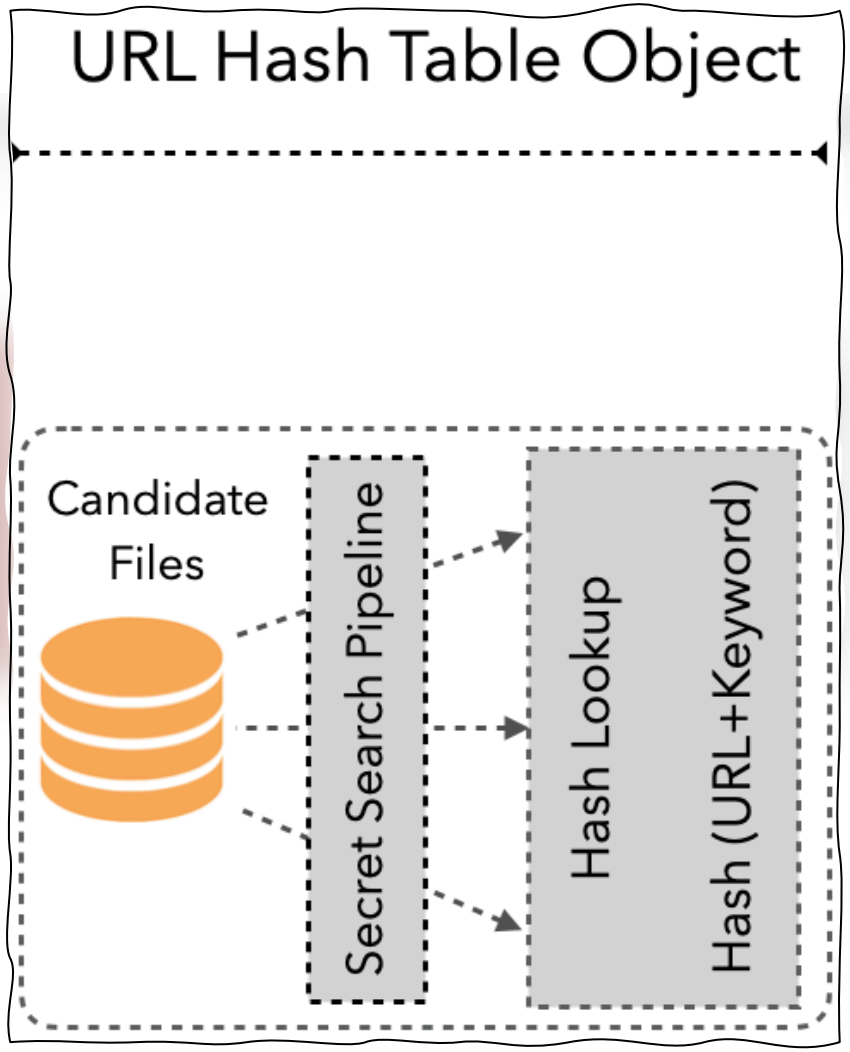
Primary Keyword

Secondary Keyword

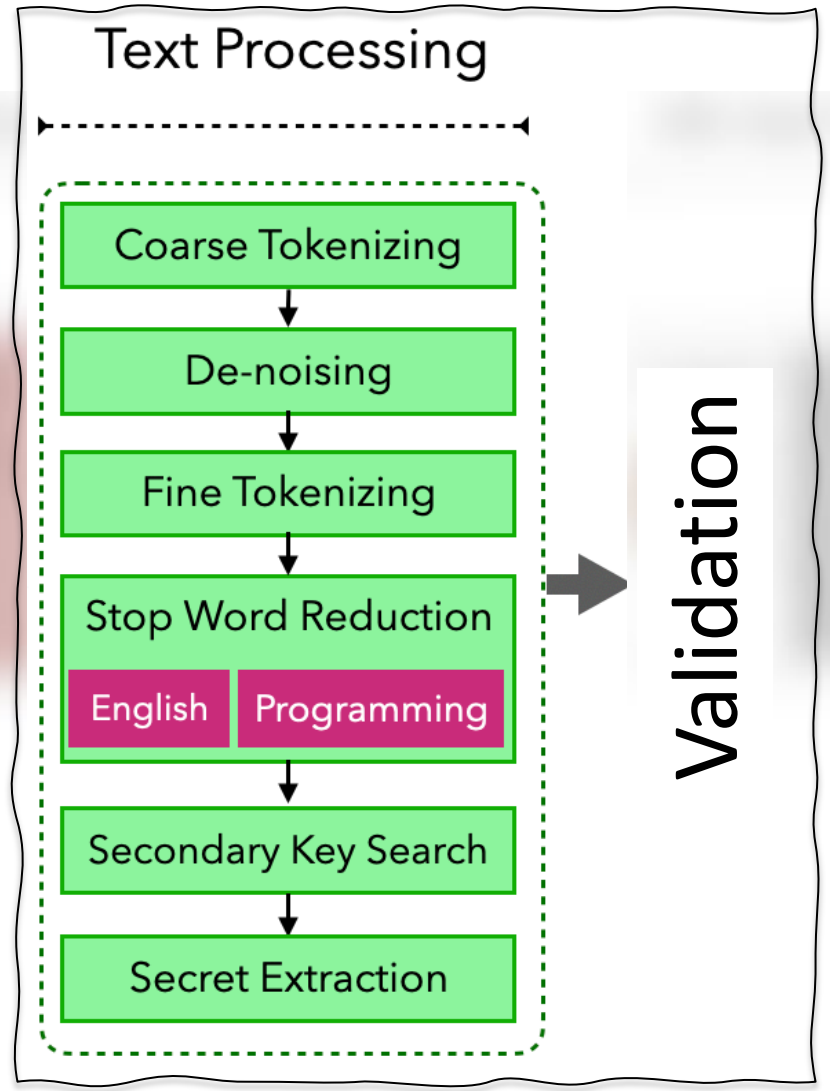
Credential Detection



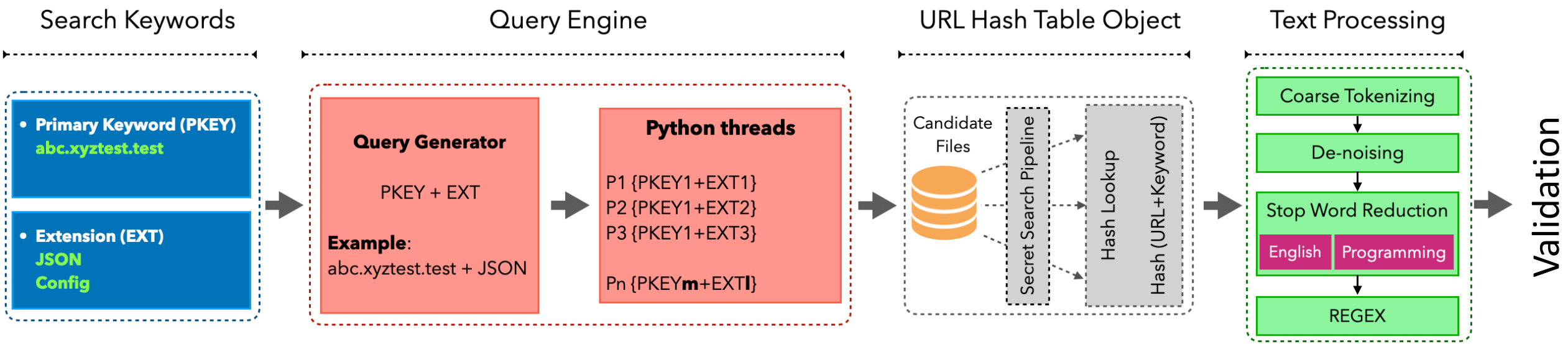
Credential Detection



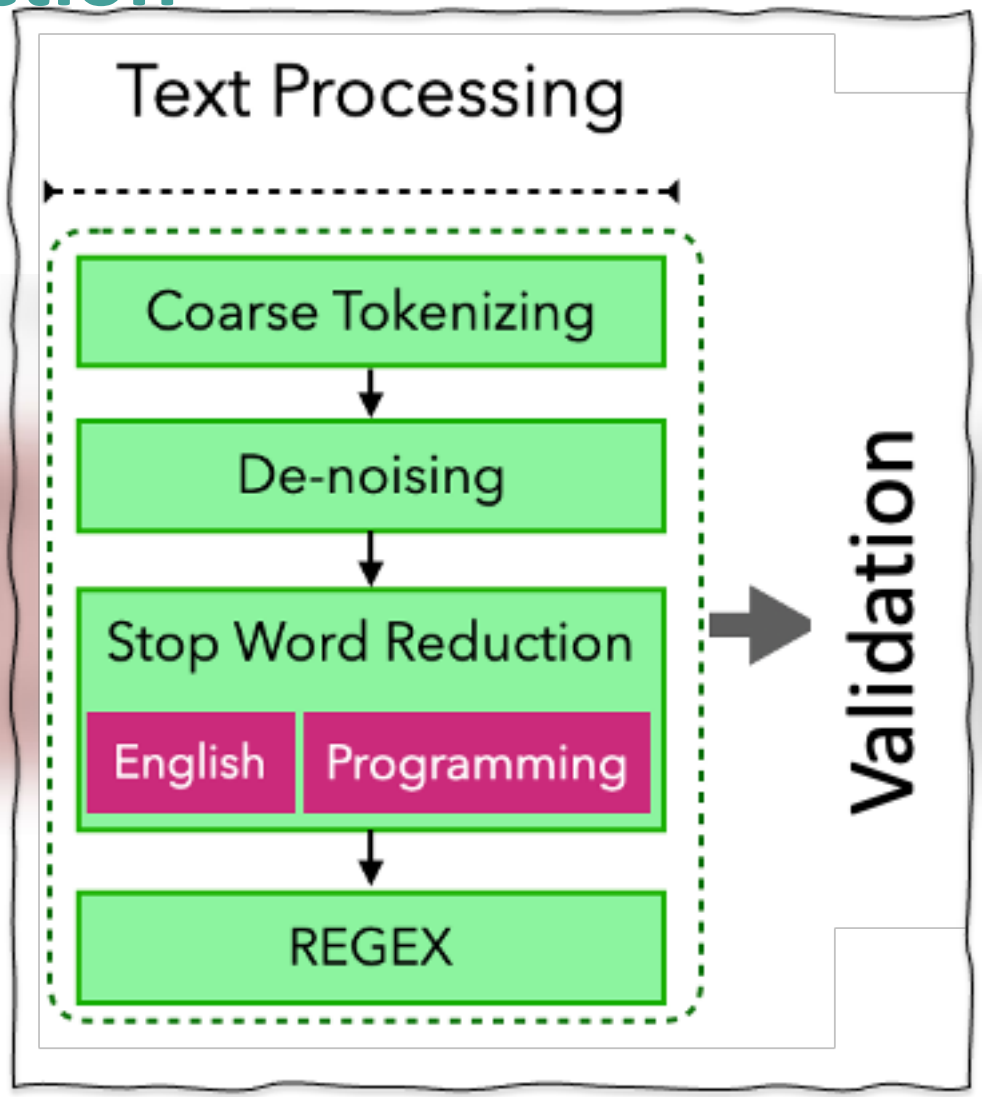
Credential Detection



Token/Key Detection



Token/Key Detection



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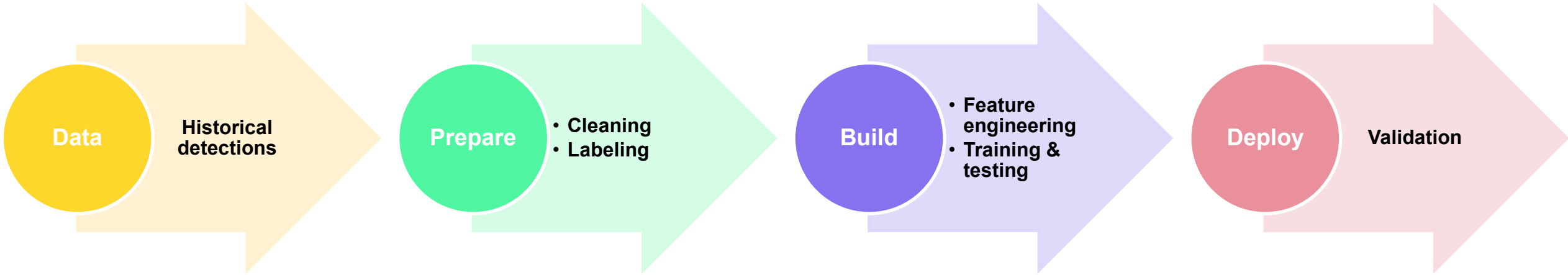
ML-based Validation Model

Validation model details

Validation Model



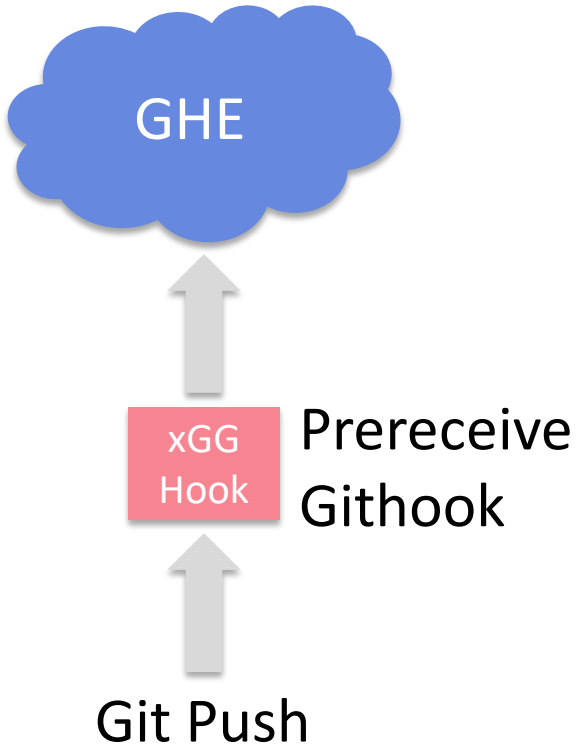
- Ngrams similarity to TPs
- Ngrams similarity to FPs
- Context-based
  - Line contains secondary keyword
  - Extension
  - Language
- Textual features

Use and Deployments

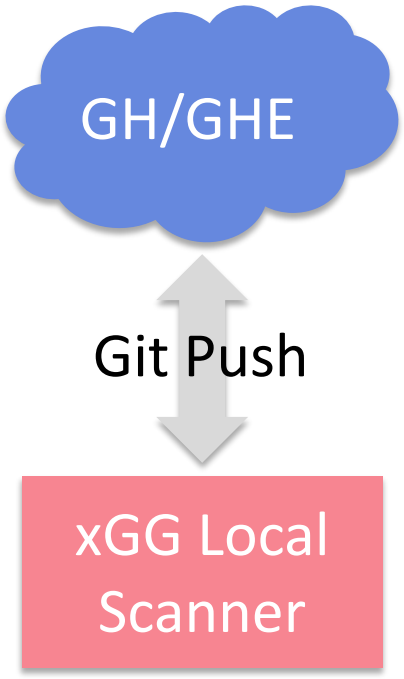
- xGitGuard is fully open-sourced:
- https://github.com/Comcast/xGitGuard
- Documented with details:
  - Installation
  - Configuration
  - Different deployments are covered

Use and Deployments

(a) Live scanner



(b) Deploy as a Githook



(c) Locally scan repos and files

Apply

- Train your developers
- Pro-actively detect secret exposures
  - Internally and externally
- Have a clear remediation plan
- Equip development teams with usable secret management services
- Mandate reviews on code version control platforms
- Rotate secrets periodically

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Thank you!

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