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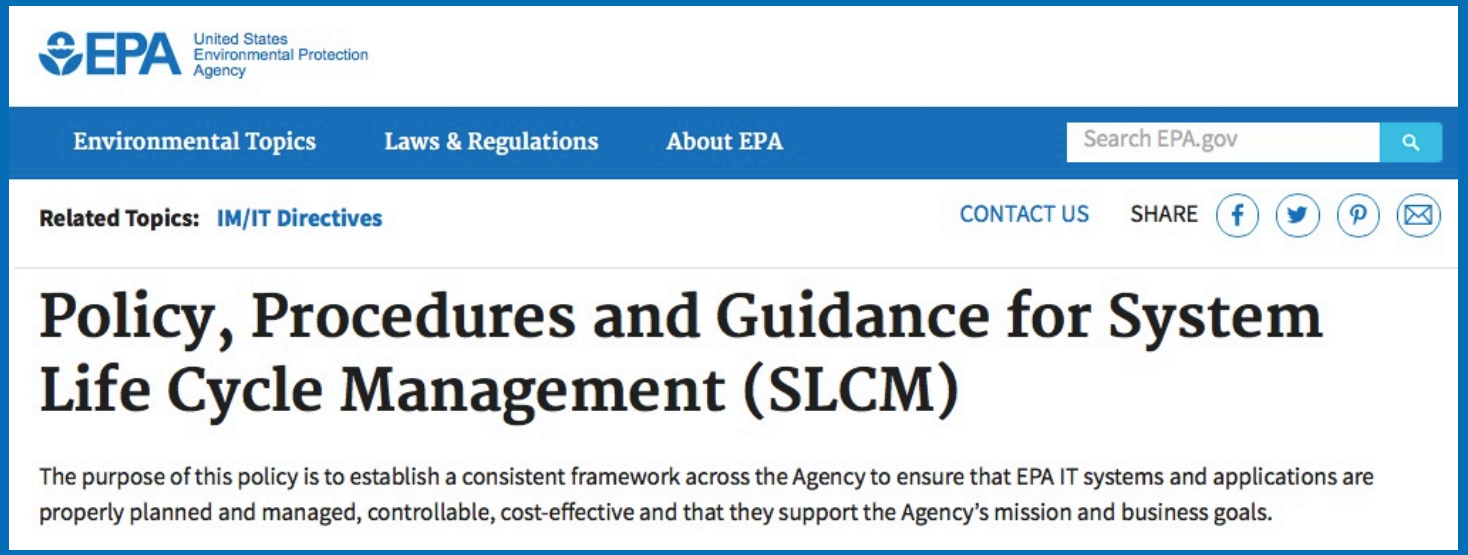
DDES Webinar Series: LMMD, *System Life Cycle Management (SLCM)*

Daniel L. Young, NRMRL/LMMD/ECEB



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Overview

NRMRL and LMMD efforts to comply with:

- The OMB mandate,
- The Federal Source Code Policy, and
- EPA's Interim Open Source Software Policy.

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Introduction

- How we manage software in NRMRL… consistently throughout the Division.
- Steven Jones, NRMRL DQA, greatly supports a strong Software Quality Assurance (SQA) program with specific focus on:
  - System Life Cycle Management (SLCM)
  - Software Configuration Management
  - Verification & Validation (V&V) Testing
  - EPA Requirements for QA Project Plans, QA/R-5
    - Cat B, sub-set.

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QAPP & System Life Cycle Management (SLCM) requirements.

- ORD QA TRACK
  - Scientific Data: Data-Sets
  - Scientific Data: Database
  - Scientific Data: Models
  - Computer Product (**CP**) removed… **QA/SW disconnect**?????
- US EPA GitHub – External Collaboration
  - Source Code
  - Dump Files
  - Wiki's
- US EPA Bitbucket – Internal Collaboration (requires PIV)

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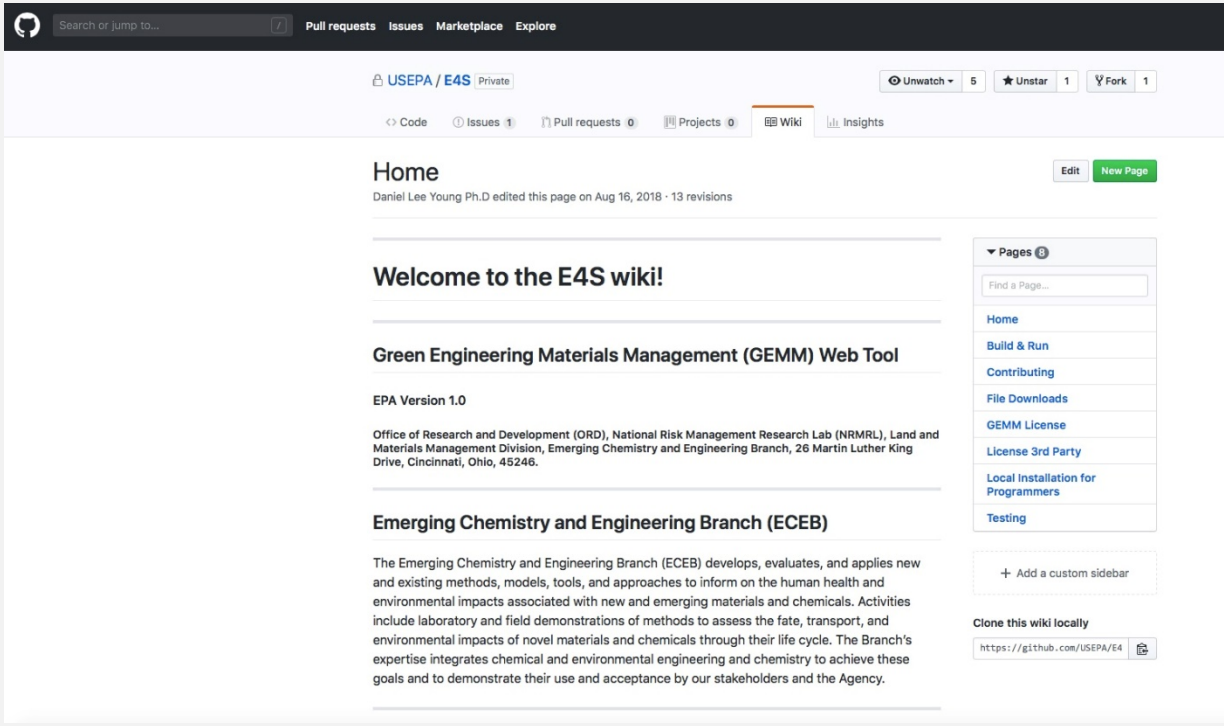
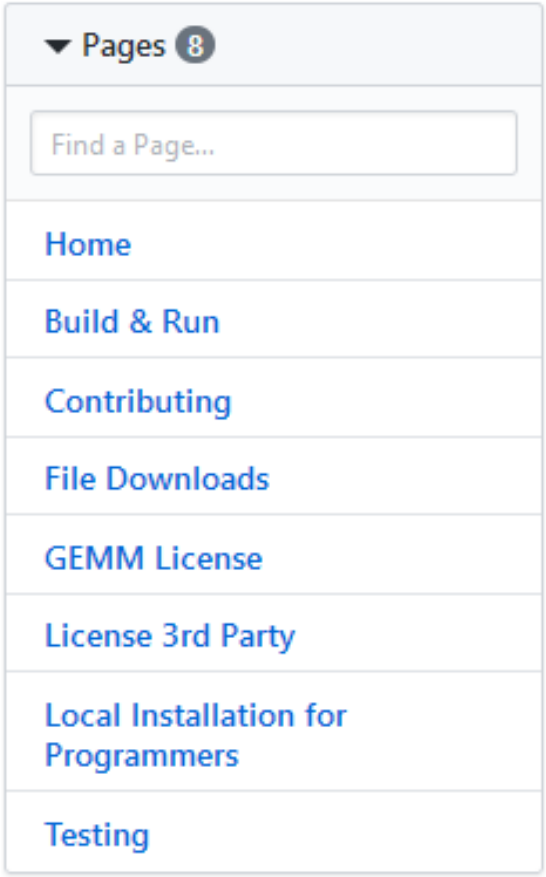
US EPA GitHub & Req. Wiki's





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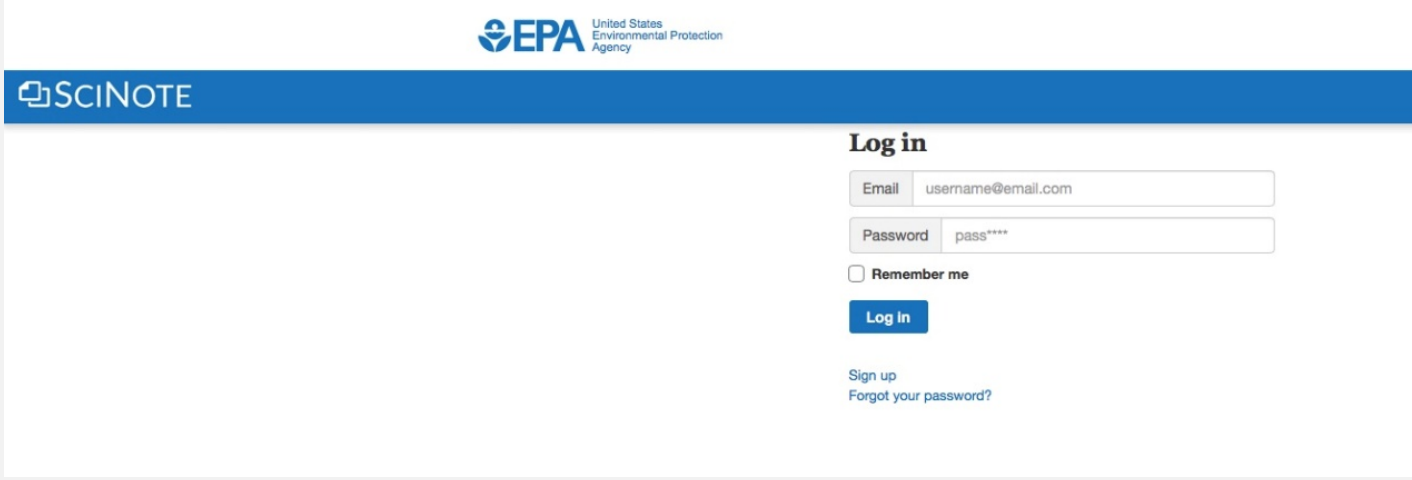
Software & Data Management Projects

- NRMRL currently manages / supports 32 Active SW Projects.
- LMMD currently manages / supports 21 Active SW Projects.



Project in Production

- SciNote. NRMRL sponsored Electronic Laboratory & Field Notebook.
  - Docker | Ruby Rails Development Environment
  - Electronic Research Notebook
  - EPA Link https://ordscinote.epa.gov/
  - Vendor Link https://my.scinote.net/

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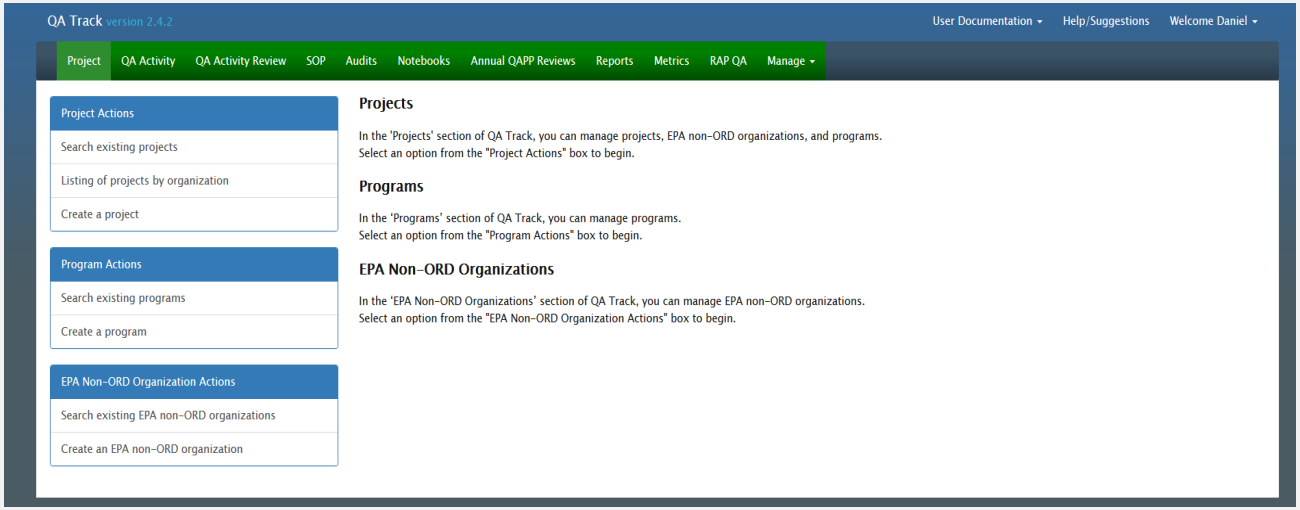
Project in Production

- ORD QA TRACK. Required QA TRACKING tool ORD.
  - Django | Python 3 Development Environment
  - Started as Division tool to replace Notes QLOG.
  - Adopted by NRMRL Fall 2015… then ORD 2016.



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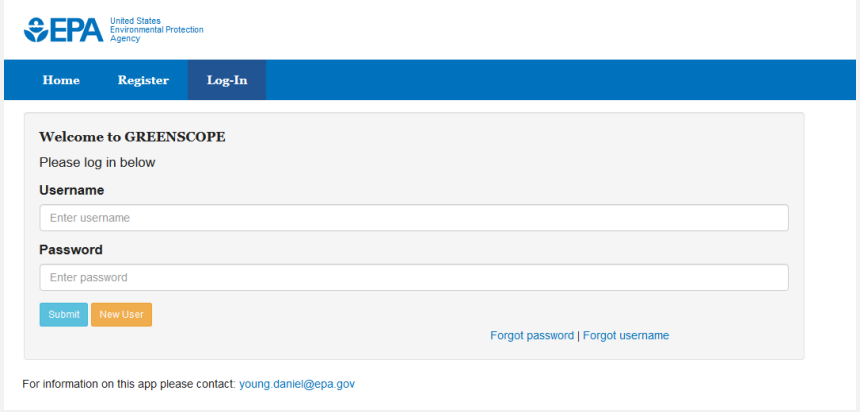
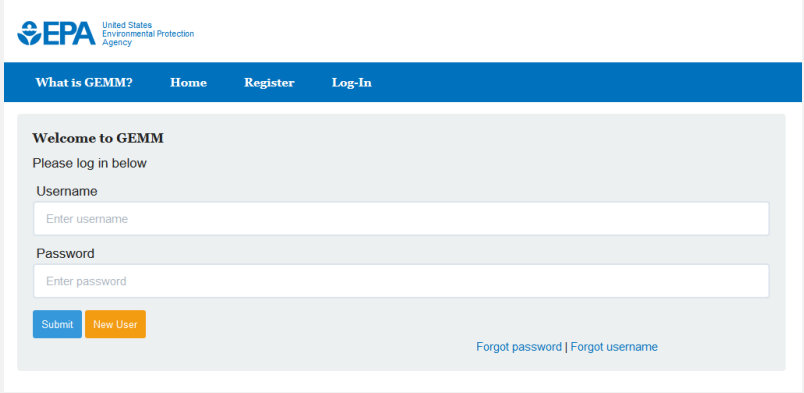


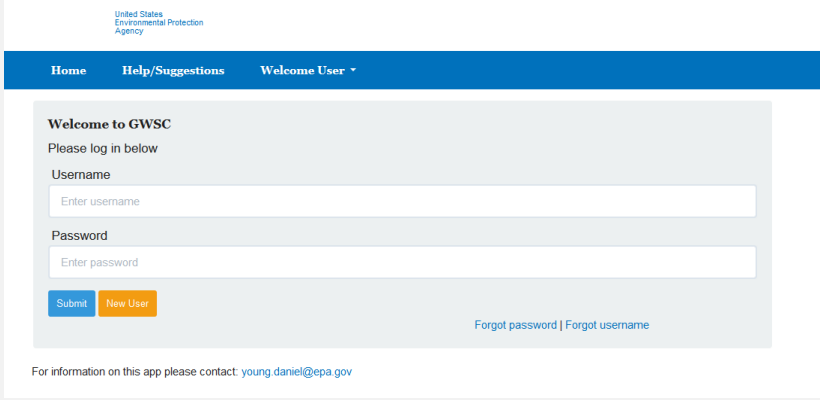
Project in Production

- GREENSCOPE.
  - Django | Python 3 Development Environment
  - The **G**auging **R**eaction **E**ffectiveness for the **EN**vironmental **S**ustainability of **C**hemistries with a multi-**O**bjective **P**rocess **E**valuator (**GREENSCOPE**) tool allows for quantifying process sustainability with about 140 indicators in four main areas:
    - Material Efficiency (26),
    - Energy (14),
    - Economics (33), and
    - Environment (66).
  - This set of indicators is capable of transmitting and translating process performance, feedstocks, utilities, equipment, and output information into a sustainability measurement scale.



Project in Production

- GEMM.
  - Django | Python 3 Development Environment
  - Previously developed by Office of Chemical Safety and Pollution Prevention (OCSPP), the **G**reen **E**ngineering **M**aterials **M**anagement model (**GEMM**) tool calculates and compares the potential environmental impacts of various material management options including destruction (e.g. via incineration), recovery, and reuse of chemicals either on-site or off-site at a different facility.
    - The evaluated metrics are: lbs. of hazardous chemicals reduced, MBTU of energy saved, lbs. of water saved, and lbs. of air emissions (e.g. CO, N2O, SOX)
    - The tool shows the financial and environmental benefits of extending the life of chemicals.
    - GEMM has been applied to a subset of high-value secondary hazardous chemicals that can be managed as chemical products rather than waste. This demonstrates that extending the lives of these chemicals increases the potential to generate substantial economic benefits as well as lowers risks to human health and the environment.



Project in Production

- GWSC.
  - Django | Python 3 Development Environment
  - **G**round**W**ater **S**eepage **C**alculator: Steady-State Single-Event Non-Redistribution and Transient Single-Event Non-Redistribution.
    - This web application utilizes steady-state sediment temperature profile to estimate groundwater seepage flux as well as Transient Single-Event Non-Redistribution.

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Planned SW Projects

- Multi-Criteria Decision Analysis or MCDA
  - Multi-Criteria Decision Analysis, or MCDA, is a valuable tool that we can apply to many complex decisions.
  - It is most applicable to solving problems that are characterized as a choice among alternatives.

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Software Lint | Linting

- Lint or a Linter.
  - A program that supports linting (verifying code quality).
  - Available for most languages e.g., JavaScript, CSS, HTML, Python, etc..
  - Running a Lint program over your source code helps to ensure that source code is legible, readable, less polluted, and easier to maintain.

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Software Lint | Linting

- Python Linters
  - PEP 8 -- Style Guide for Python Code https://www.python.org/dev/peps/pep-0008/
  - PEP 257 -- docstring Conventions https://www.python.org/dev/peps/pep-0257/

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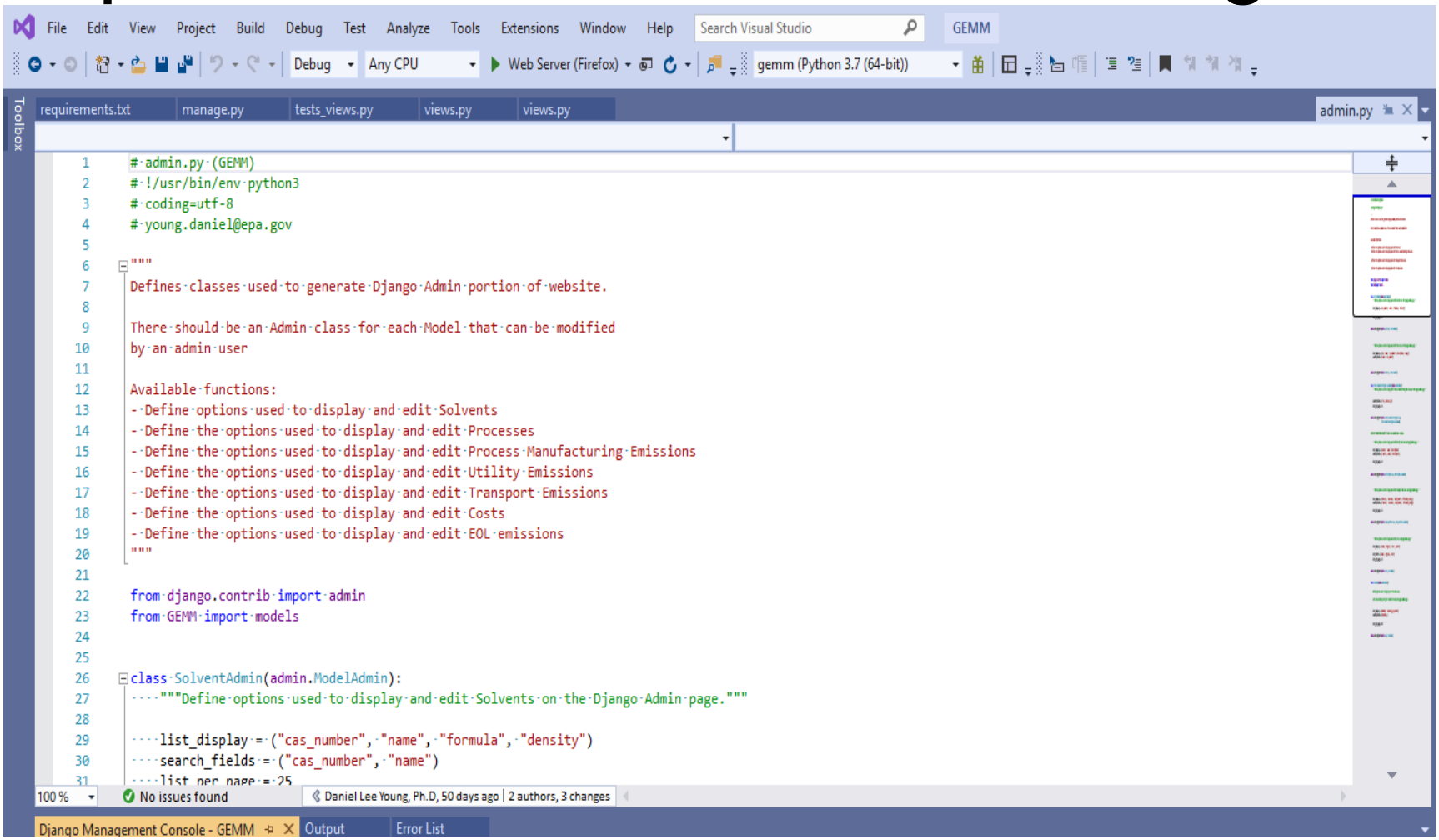
Commenting Code

- Triple quote strings
- # Comment using pound sign inline that python ignores
- Docstrings (uses triple quotes)

Triple Quote & Module docstring



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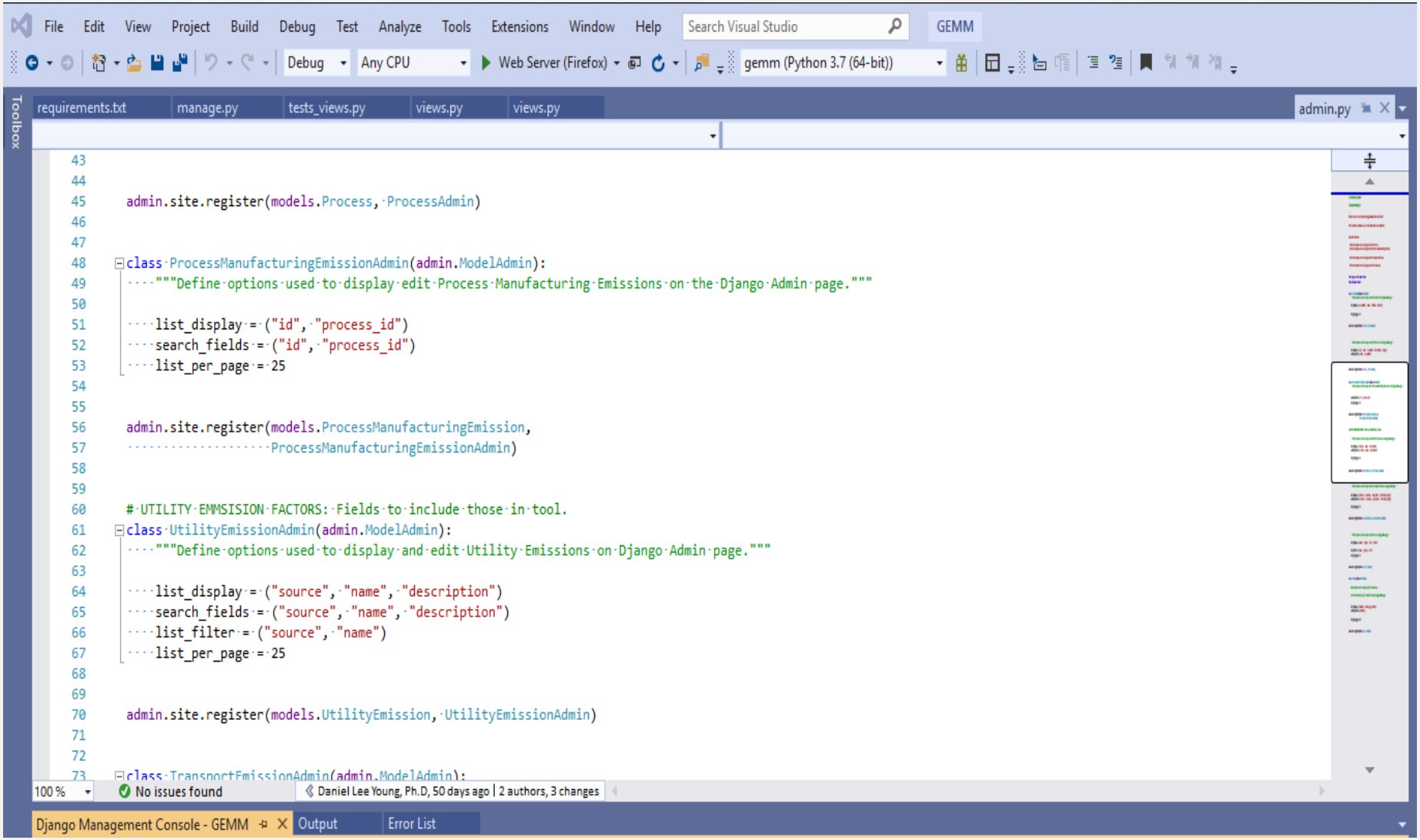
Comment & Class docstring



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Software Lint | Linting

- Other Linters
  - Ruby: RuboCop
  - C#: Stylecop, FxCop

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Software Development

- Preferred IDE's are:
  - Microsoft Visual Studio Professional 2017/19*.
    - Fully integrated Python/Anaconda*.
  - Microsoft Visual Studio Code.

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VS Professional…

- Visual Studio Professional 2019
  - Run our 51 tests… immediate results!
    - 3 Tests Failed? Some work left…
    - 48 Test Passed!
  - Run our Linter… PyLint… immediate results!
    - 2 Errors | 2 Warnings | 16 Messages
  - Build & Run app localhost… immediate results!
  - No need to wait on a complier!

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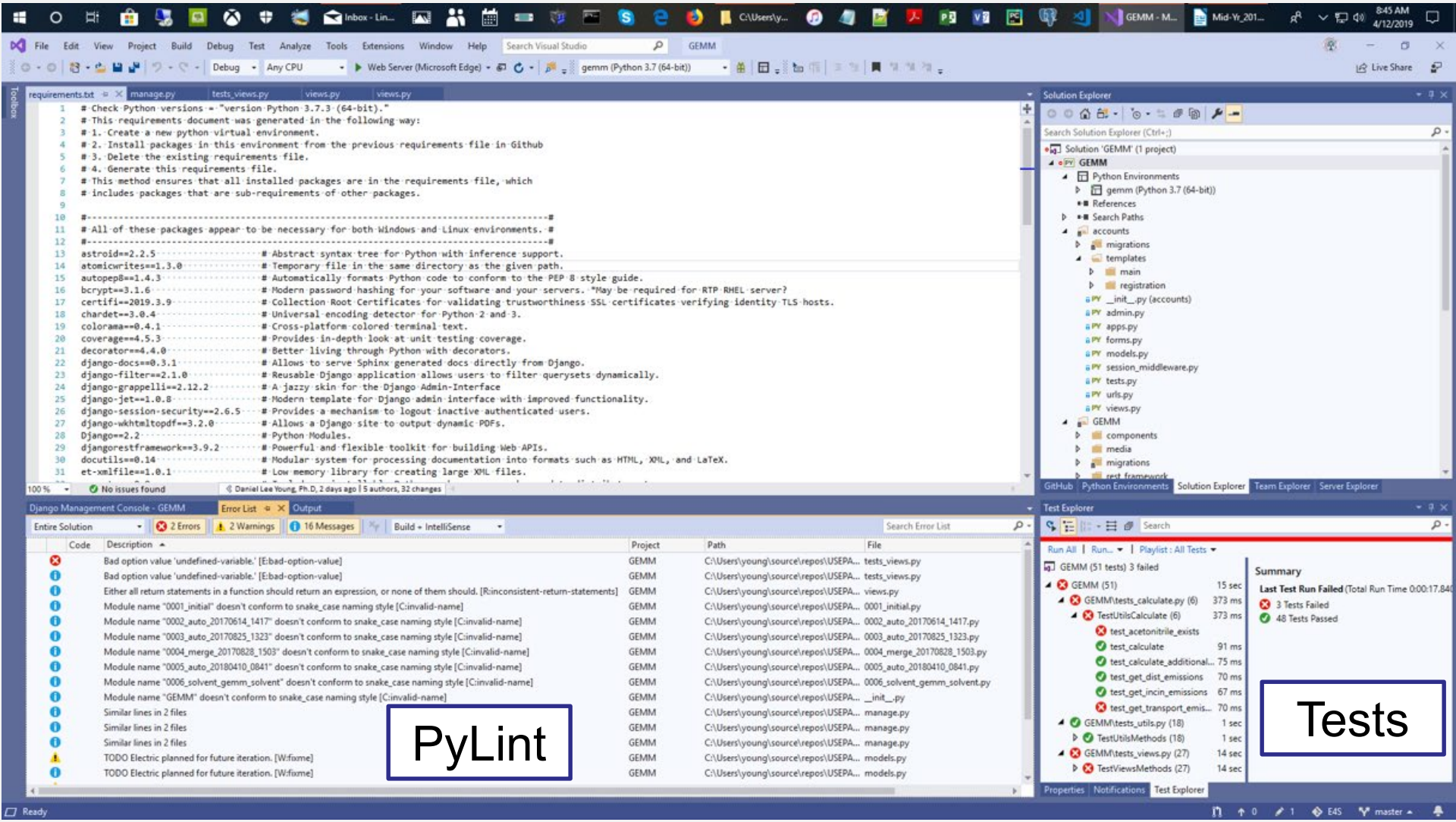
PyLint & Testing



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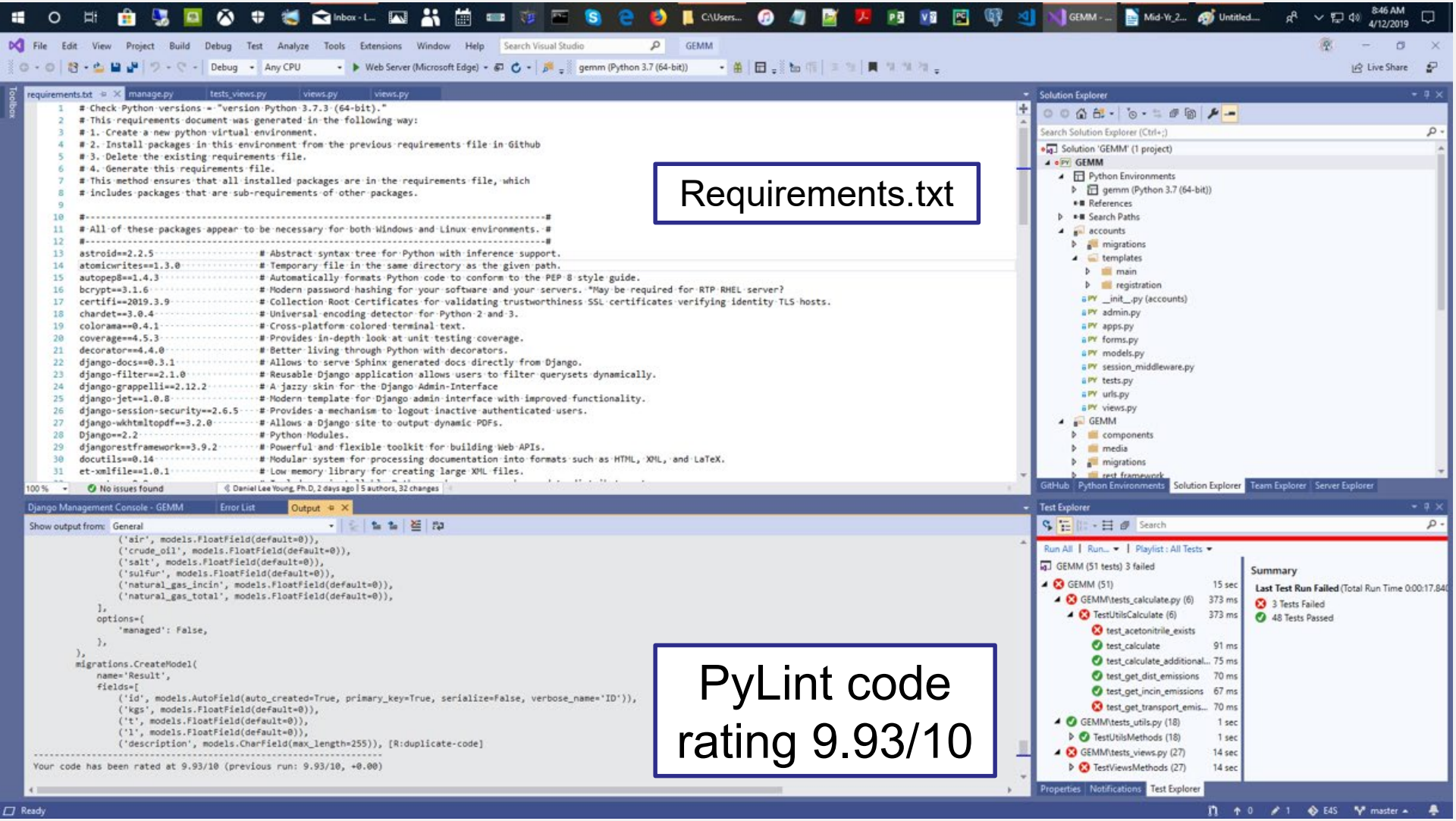
PyLint Code Rating | Req's



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VS Code…

Switching between lint tools…
CTRL+SHIFT+P

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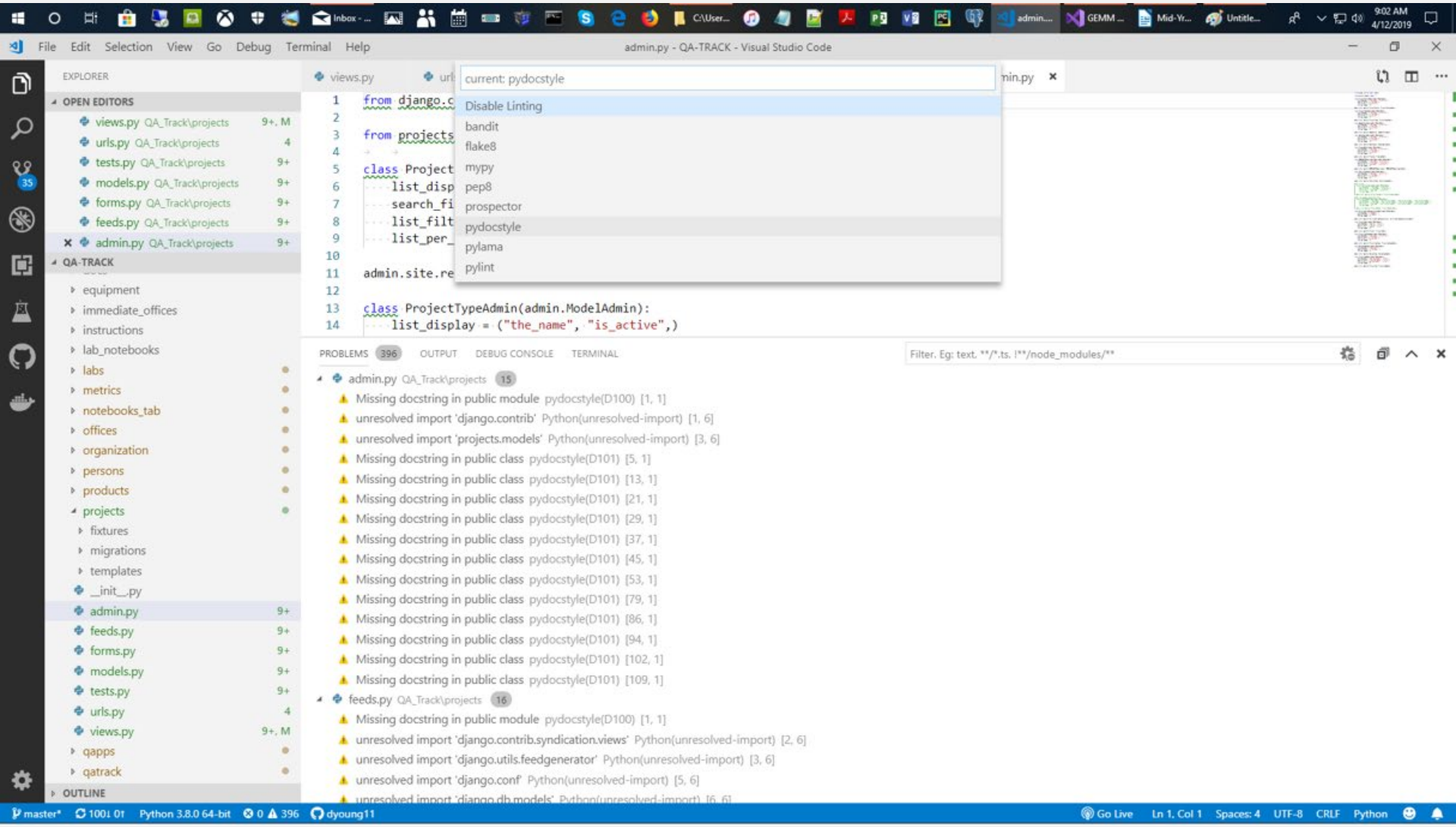
pydocstyle



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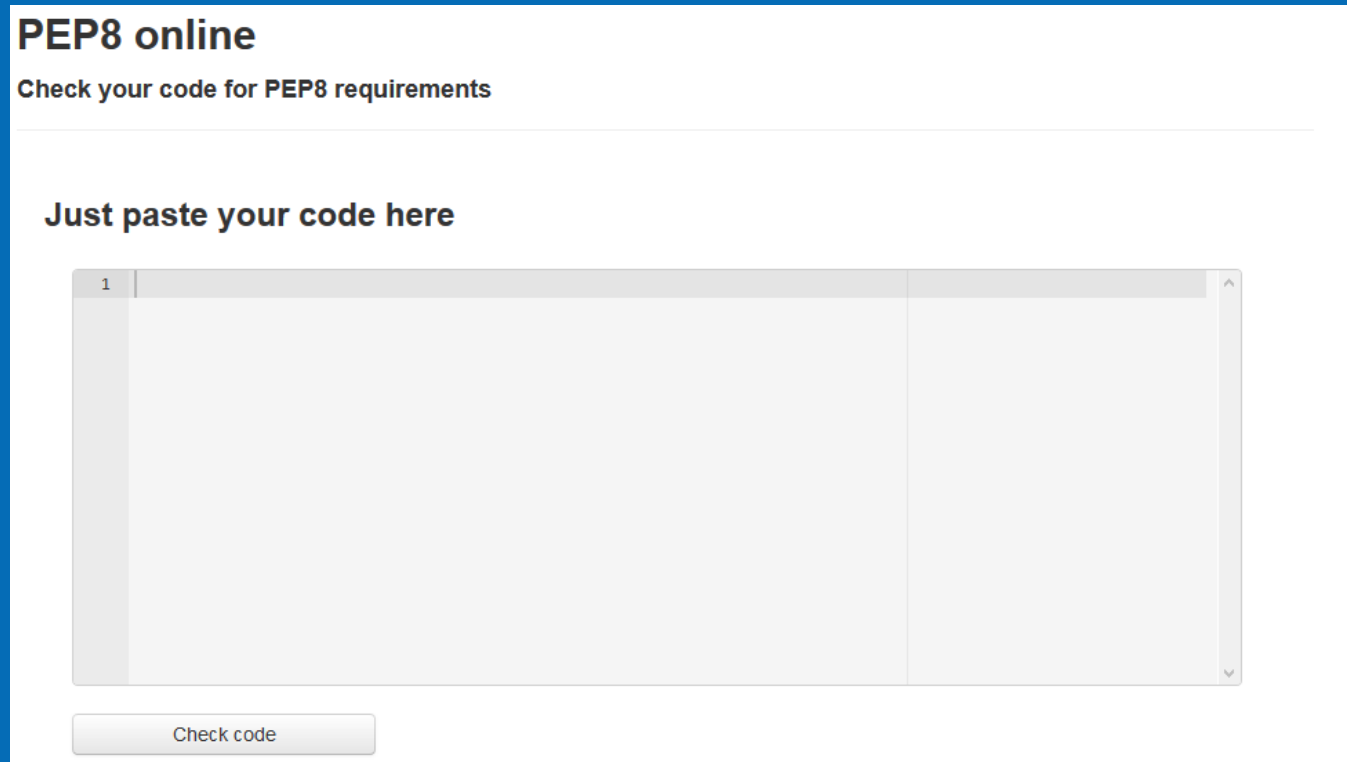
Online Linters & Other info…

Cut & Paste | http://pep8online.com/



NRMRL SOPs for SW

- Software Configuration Management (SCM), Date: 04/11/2018, SOP Number (G-LMMD-SOP-1399-0).
  - This procedure establishes the responsibilities and process for implementing and documenting Software Configuration Management (SCM) activities within the Land and Materials Management Division (LMMD).

NRMRL SOPs for SW

- Software Verification & Validation (V&V), Date: 04/11/2018. SOP Number (G-LMMD-SOP-1396-0).
  - The purpose of this procedure is to provide the methodology for performing the testing, verification and validation (V&V), and / or independent verification and validation (IV&V) processes throughout the software life cycle.
  - This SOP has been developed to further assist researchers in the Land and Materials Management Division (LMMD) with documenting data that is analyzed during the testing, V&V, and independent verification & validation (IV&V) activities of a Software Development Life Cycle (SDLC), i.e., SLCM.

Django Admin Docs

- https://docs.djangoproject.com/en/2.2/ref/contrib/admin/admindocs/
- “Django’s admindocs app pulls documentation from the docstrings of models, views, template tags, and template filters for any app in INSTALLED_APPS and makes that documentation available from the Django admin.”

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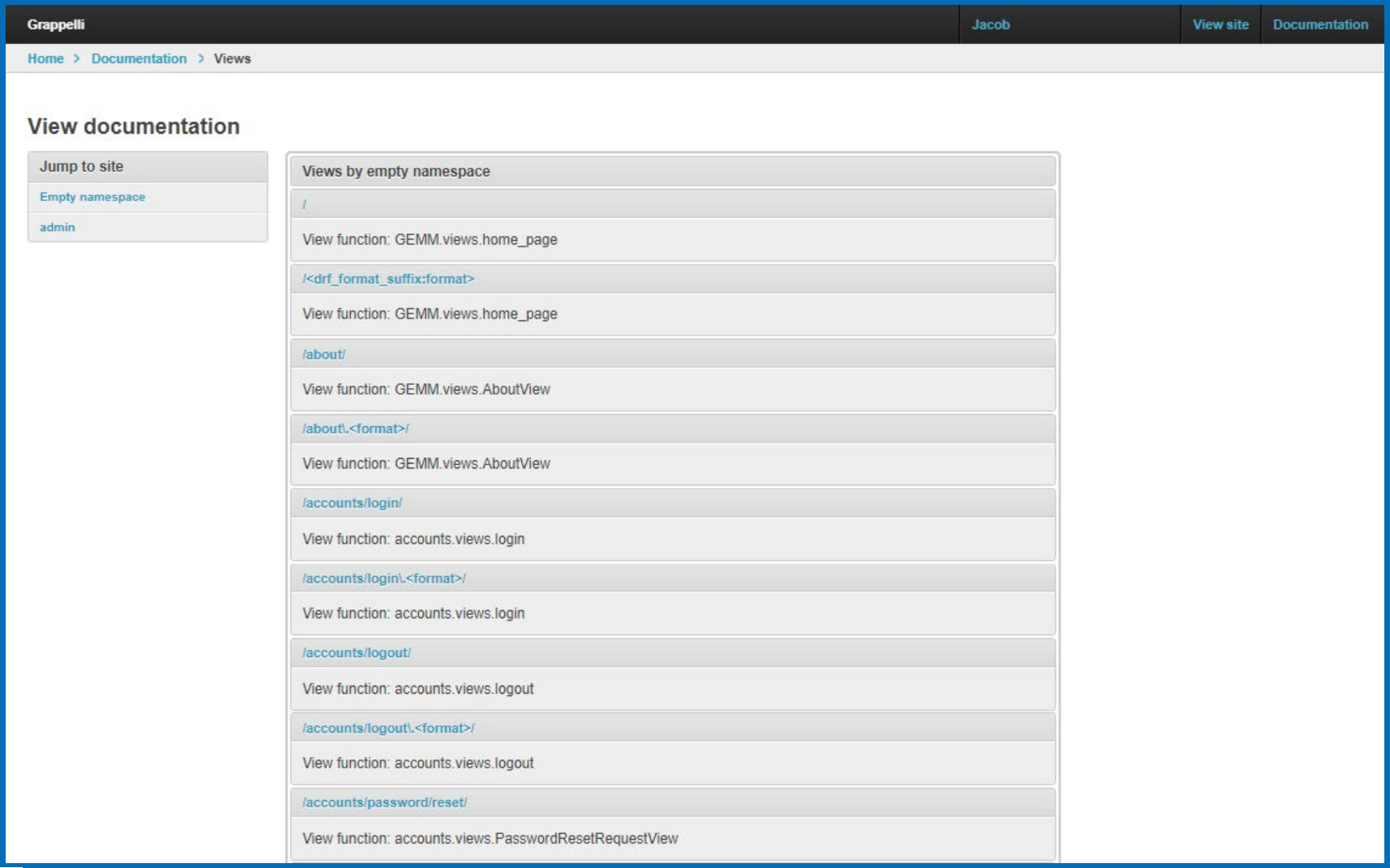
Django Admin



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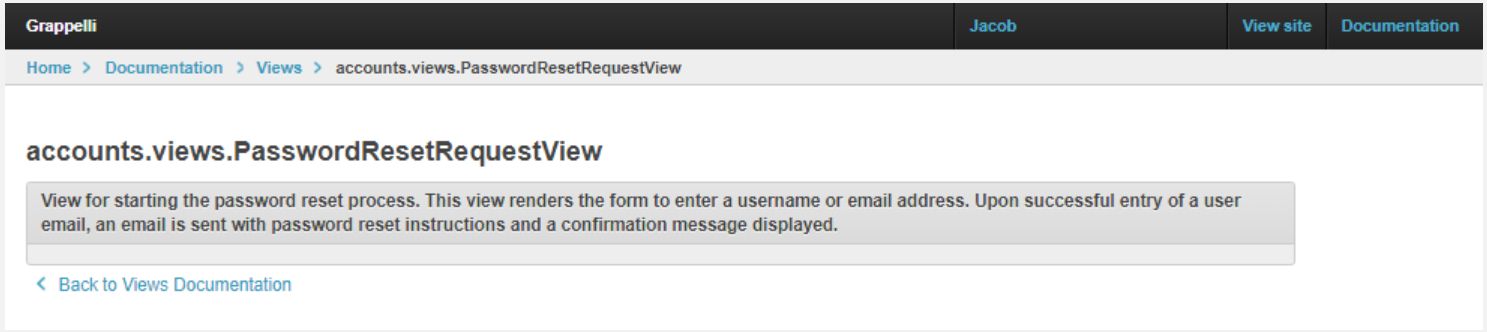
Django Admin



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Closing Remarks

- If you have any questions please contact me @ (513) 569-7451 or young.daniel@epa.gov.
- If you would like to provide input, comments, or suggestions to the LMMD SCM or V&V SOP, contact Dr. Michael Gonzalez.

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Resources

- EPA Requirements for QA Project Plans (QA/R-5)
- Policy, Procedures and Guidance for System Life Cycle Management (SLCM)
- System Life Cycle Management (SCM) Procedure. CIO 2121-P-03.0. Issued by the EPA Chief Information Officer, Pursuant to Delegation 1-19, dated 07/07/2005.

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Resources

- EPA Developer Guidance.
  - https://developer.epa.gov/guide/templates-guides/waterfall/
  - https://developer.epa.gov/guide/templates-guides/agile/agile-frameworks/
- GitHub Guidance.

Resources

- ORD IT Resources, GitHub.
- United States Environmental Protection Agency, GitHub.
- United States Environmental Protection Agency, Web Guide.