FITMENT STANDARDIZATION

By: Peter Mittelbrun & Gerardo Gomez

PROJECT GOAL:

HELP AUTOMATE CMS TABLE CREATION & STANDARDIZE THE FITMENT PROCESS

OVERVIEW

Research Current Process

Gather information about how we currently handle fitment/data in general

ACES/PIES & Data Research

Explore data enrichment opportunities that could benefit the company

Program Overview

Design and create a desktop app to help with automation

Results

Monitor results and adjust process accordingly

CURRENT PROCESS

Data Process SWOT Analysis

Strengths

- Powersport expert PMs
- Strong/motivated data team
- Growth mindset leadership

Weaknesses

- Non-standardized internal data
- Receiving unformatted data
- Inefficient processes

Opportunities

- ACES/PIES
- Fitment standardization
- Data mapping tools

Threats

- Competitors standardizing
- Inaccurate vendor data
- Vendor data format

PROBLEMS

VEHICLE NAMING

Disconnect between PMs and data team

VERY MANUAL PROCESS

Fitment process has a lot of manual steps with opportunity for optimization

NONUTILIZED WORK HOURS

Employees are having to focus on manual tasks in the current process when their time could be used for growing company

VENDOR DATA

We receive data however the vendor wants to send it, which causes more cleaning, slowing time to market for products

CURRENT PROCESS

- PMs spend most of their time doing data entry
- Manual CMS table creation/editing from vendor file
- Extremely time consuming
- Less opportunity for market research

WATER PUMP REPAIR KIT

NEW ITEMS IN BLUE | UPDATED APPLICATIONS IN RED

APPLICATION	YEAR	OEM#	NI#
POLARIS			
500 XC SP	2007	3090254, 5133689	SM-10086
600 CLEANFIRE SWITCHBACK	2007	3090254, 5133689	SM-10086
600 DRAGON SP/ES EURO	2009	3090254, 5133689	SM-10086
600 DRAGON SWITCHBACK	2010	3090254, 5133689	SM-10086
600 HO IQ	2007	3090254, 5133689	SM-10086
600 HO IQ TOURING CLEANFIRE/EURO	2007	3090254, 5133689	SM-10086
600 HO SWITCHBACK F/O	2006-07	3090254, 5133689	SM-10086
600 INDY ADVENTURE 137 SC	2020	3090254, 5133689	SM-10086
600 INDY ALL	2013-20	3090254, 5133689	SM-10086
600 INDY XC 129	2019-20	3090254, 5133689	SM-10086
600 INDY XC 137/INTL	2020	3090254, 5133689	SM-10086
600 IQ DRAGON	2008	3090254, 5133689	SM-10086
600 IQ LX	2008	3090254, 5133689	SM-10086
600 IQ LXT	2011-13	3090254, 5133689	SM-10086
600 IQ RACER	2010	3090254, 5133689	SM-10086
600 IQ RACER	2008-16	3090254, 5133689	SM-10086
600 IQ RACER/EURO	2008-09	3090254, 5133689	SM-10086
600 IQ RACER/INTL	2011-13	3090254, 5133689	SM-10086
600 IQ SHIFT	2009-11	3090254, 5133689	SM-10086
600 IQ TOURING/EURO	2007-10	3090254, 5133689	SM-10086
600 IQ WIDETRAK/INTL	2017	3090254, 5133689	SM-10086
600 IQ/ES/ES EURO	2009	3090254, 5133689	SM-10086
600 IQR/ RACER/INTL	2014-23	3090254, 5133689	SM-10086
600 PRO RMK	2012-15	3090254, 5133689	SM-10086
600 PRO RMK AXYS 155	2016-20	3090254, 5133689	SM-10086
600 PRO-RIDE RUSH	2010	3090254, 5133689	SM-10086
600 RACER/INTL	2017-23	3090254, 5133689	SM-10086
600 RMK ALL	2007-15	3090254, 5133689	SM-10086
600 RMK 144/155	2016-20	3090254, 5133689	SM-10086
600 RR EURO	2008-09	3090254, 5133689	SM-10086
600 RUSH	2011-14	3090254, 5133689	SM-10086

POLARIS						
x	NOTES:					
	†, Three used per machine (2F, 1R)					
	**, Stiffer, more durable compound than OEM					
x	340 Cutlass	`81	5410390	11-4011	**	14.95
x	400 Indy	`86-91	5410390	11-4011	**	14.95
x	440 Indy	`92	5410390	11-4011	**	14.95
x	440 Indy, SKS,	`93-98	5410390	11-4011	**	14.95
x	440 XC	`97	3021099	11-4025		17.95
x	440 XCR, SP	`92-96	5410390	11-4011	**	14.95
x	440 XCR	`97-99	3110061	11-4023		17.95
x	440 IQ	`07	3021717	11-4029	†	21.95
x	500 Indy, RMK, SKS	`89-96	5410390	11-4011	**	14.95
x	500 Classic	`99	3110061	11-4023		17.95
x	500 Classic	`00-01	3110061	11-4023		17.95
x	500 Classic	`02-06	3021033, -098, - 220, -298	11-4024		16.95
x	500 Classic Touring	`01-03	3110061	11-4023		17.95
x	500 Edge	`03-04	3021033, -098, - 220, -298	11-4024		16.95
x	500 Indy	`89-96	5410390	11-4011	**	14.95
x	500 Indy	`97-99	3110061	11-4023		17.95
x	500 Indy	`00	3110061	11-4023		17.95
x	500 RMK	`97-02	3110061	11-4023		17.95
x	500 SKS	`02	3021099	11-4025		17.95
x	500 Transport	`09	3021033, -098, - 220, -298	11-4024		16.95
x	500 XC	`99-00	3110061	11-4023		17.95

CMS TABLE

NOVUS VEHICLES

vehicle_id	vehicle_type	year_id	year	make_id	make	model_id	model
21196	snow	43	1997	39	Polaris	5273	500 Indy 121"
21197	snow	44	1998	39	Polaris	5273	500 Indy 121"
21198	snow	45	1999	39	Polaris	5273	500 Indy 121"
21199	snow	46	2000	39	Polaris	5273	500 Indy 121"
21200	snow	47	2001	39	Polaris	5273	500 Indy 121"
21201	snow	48	2002	39	Polaris	5273	500 Indy 121"
21202	snow	51	2005	39	Polaris	5273	500 Indy 121"
21203	snow	52	2006	39	Polaris	5273	500 Indy 121"

DATA TEAM UPLOAD

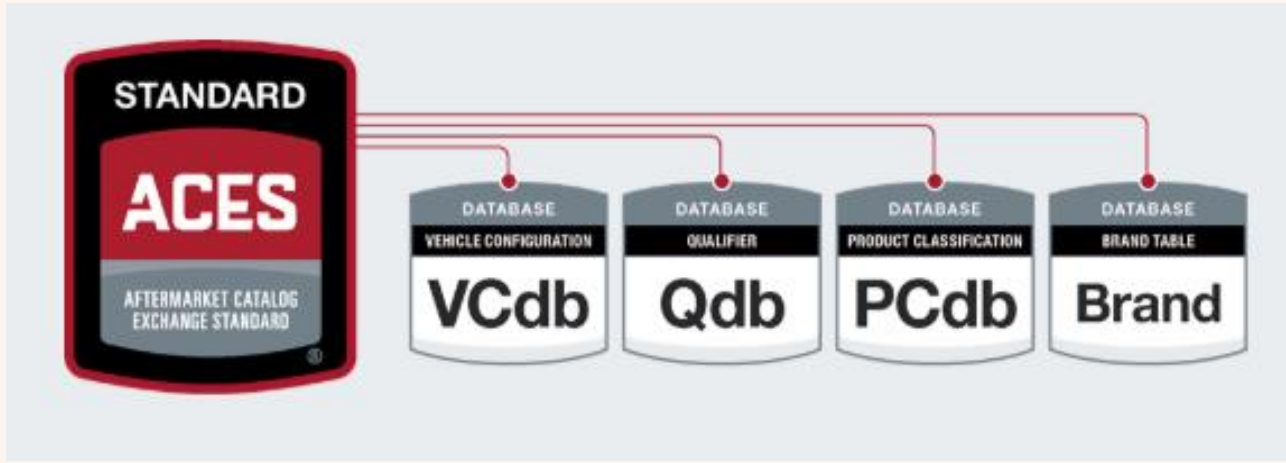
26822	44-52054
26810	44-52054
26823	44-52054
28116	44-52054
30163	44-52054
32272	44-52054

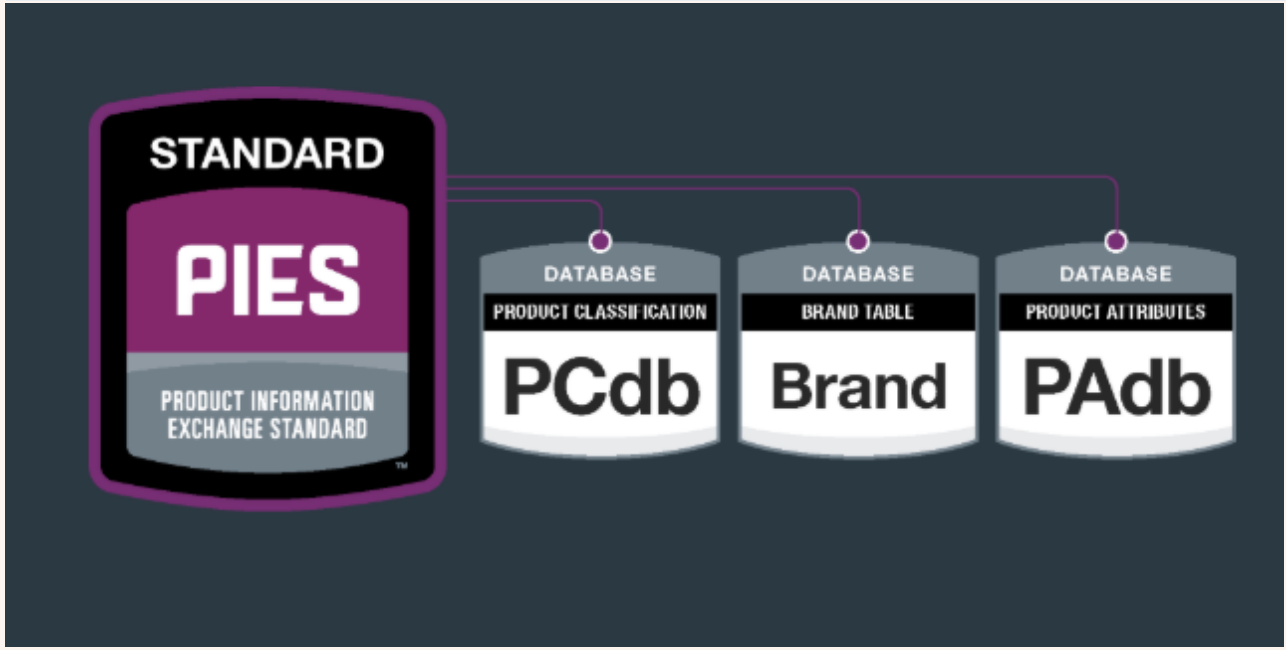
DATA ENRICHMENT RESEARCH

DATA RESEARCH

ACES/PIES Standard

- ACES is fitment, YMM with columns for submodel etc.
- PIES is desc, attributes, and classifications
- Together they make a very detailed database (VCdb)





TrimId	ModelYear	mfrname	modelname	trimname	producttypename	Year	Manufacturer	Model_Name	Trim_Name	Family_Name	Product_Type	Generic_Type_Primary	Revision_Status
318134	2021	Arctic Cat	Blast	LT 4000 146 1.6	Snowmobile	2021	Arctic Cat	Blast	LT 4000 146 1.6	Blast	Snowmobile	Utility	New
318132	2021	Arctic Cat	Blast	M 4000 146 2.0	Snowmobile	2021	Arctic Cat	Blast	M 4000 146 2.0	Blast	Snowmobile	Mountain	New
318135	2021	Arctic Cat	Blast	M 4000 146 2.0 Special Edition	Snowmobile	2021	Arctic Cat	Blast	M 4000 146 2.0 Special Edition	Blast	Snowmobile	Mountain	New
318133	2021	Arctic Cat	Blast	ZR 4000 121 1.0	Snowmobile	2021	Arctic Cat	Blast	ZR 4000 121 1.0	Blast	Snowmobile	Trail	New
318576	2021	Arctic Cat	M 8000	Hardcore Alpha One 154 2.6	Snowmobile	2021	Arctic Cat	M 8000	Hardcore Alpha One 154 2.6	M	Snowmobile	Mountain	Carryover
318585	2021	Arctic Cat	M 8000	Hardcore Alpha One 154 2.6 ES	Snowmobile	2021	Arctic Cat	M 8000	Hardcore Alpha One 154 2.6 ES	M	Snowmobile	Mountain	New
318586	2021	Arctic Cat	M 8000	Hardcore Alpha One 154 3.0	Snowmobile	2021	Arctic Cat	M 8000	Hardcore Alpha One 154 3.0	M	Snowmobile	Mountain	New
318577	2021	Arctic Cat	M 8000	Hardcore Alpha One 165 3.0	Snowmobile	2021	Arctic Cat	M 8000	Hardcore Alpha One 165 3.0	M	Snowmobile	Mountain	Carryover
318578	2021	Arctic Cat	M 8000	Hardcore Alpha One 165 3.0 ES	Snowmobile	2021	Arctic Cat	M 8000	Hardcore Alpha One 165 3.0 ES	M	Snowmobile	Mountain	Carryover
318890	2021	Arctic Cat	M 8000	Mountain Cat Alpha One 154 3.0	Snowmobile	2021	Arctic Cat	M 8000	Mountain Cat Alpha One 154 3.0	M	Snowmobile	Mountain	Carryover
318891	2021	Arctic Cat	M 8000	Mountain Cat Alpha One 154 3.0 ES	Snowmobile	2021	Arctic Cat	M 8000	Mountain Cat Alpha One 154 3.0 ES	M	Snowmobile	Mountain	Carryover
318892	2021	Arctic Cat	M 8000	Mountain Cat Alpha One 165 3.0	Snowmobile	2021	Arctic Cat	M 8000	Mountain Cat Alpha One 165 3.0	M	Snowmobile	Mountain	Carryover
318893	2021	Arctic Cat	M 8000	Mountain Cat Alpha One 165 3.0 ES	Snowmobile	2021	Arctic Cat	M 8000	Mountain Cat Alpha One 165 3.0 ES	M	Snowmobile	Mountain	Carryover
318575	2021	Arctic Cat	M 8000	Mountain Cat Alpha One 165 3.0 w/ATAC	Snowmobile	2021	Arctic Cat	M 8000	Mountain Cat Alpha One 165 3.0 w/ATAC	M	Snowmobile	Mountain	New
317325	2021	Arctic Cat	Norseman	X 8000	Snowmobile	2021	Arctic Cat	Norseman	X 8000	Norseman	Snowmobile	Utility	Carryover
318119	2021	Arctic Cat	Riot	6000 146 1.6 ARS II	Snowmobile	2021	Arctic Cat	Riot	6000 146 1.6 ARS II	Riot	Snowmobile	Performance	Carryover
318121	2021	Arctic Cat	Riot	8000 146 1.35 ARS II w/QS3	Snowmobile	2021	Arctic Cat	Riot	8000 146 1.35 ARS II w/QS3	Riot	Snowmobile	Performance	Carryover
318120	2021	Arctic Cat	Riot	8000 146 1.6 ARS II	Snowmobile	2021	Arctic Cat	Riot	8000 146 1.6 ARS II	Riot	Snowmobile	Performance	Carryover
318125	2021	Arctic Cat	Riot	8000 146 1.6 ARS II w/QS3	Snowmobile	2021	Arctic Cat	Riot	8000 146 1.6 ARS II w/QS3	Riot	Snowmobile	Performance	New
318122	2021	Arctic Cat	Riot	X 8000 146 2.6 AMS	Snowmobile	2021	Arctic Cat	Riot	X 8000 146 2.6 AMS	Riot	Snowmobile	Performance	Upgraded
318128	2021	Arctic Cat	Riot	X 8000 146 2.6 AMS w/QS3	Snowmobile	2021	Arctic Cat	Riot	X 8000 146 2.6 AMS w/QS3	Riot	Snowmobile	Performance	New
317322	2021	Arctic Cat	ZR	120	Snowmobile	2021	Arctic Cat	ZR	120	ZR	Snowmobile	Youth	Carryover
317323	2021	Arctic Cat	ZR	200	Snowmobile	2021	Arctic Cat	ZR	200	ZR	Snowmobile	Youth	Carryover
317392	2021	Arctic Cat	ZR 6000	Limited 137 ARS II	Snowmobile	2021	Arctic Cat	ZR 6000	Limited 137 ARS II	ZR	Snowmobile	Trail	Carryover
317393	2021	Arctic Cat	ZR 6000	Limited 137 ARS II w/ ATAC	Snowmobile	2021	Arctic Cat	ZR 6000	Limited 137 ARS II w/ ATAC	ZR	Snowmobile	Trail	Carryover
317391	2021	Arctic Cat	ZR 6000	R XC 137	Snowmobile	2021	Arctic Cat	ZR 6000	R XC 137	ZR	Snowmobile	Trail	Carryover
317394	2021	Arctic Cat	ZR 8000	Limited 137 ARS II	Snowmobile	2021	Arctic Cat	ZR 8000	Limited 137 ARS II	ZR	Snowmobile	Trail	Carryover
317399	2021	Arctic Cat	ZR 8000	Limited 137 ARS II w/ ATAC	Snowmobile	2021	Arctic Cat	ZR 8000	Limited 137 ARS II w/ ATAC	ZR	Snowmobile	Trail	Carryover
317397	2021	Arctic Cat	ZR 8000	RR 137	Snowmobile	2021	Arctic Cat	ZR 8000	RR 137	ZR	Snowmobile	Trail	Carryover
317331	2021	Arctic Cat	ZR 9000	Thundercat 137 ARS II	Snowmobile	2021	Arctic Cat	ZR 9000	Thundercat 137 ARS II	ZR	Snowmobile	Trail	Carryover
317332	2021	Arctic Cat	ZR 9000	Thundercat 137 ARS II w/ ATAC	Snowmobile	2021	Arctic Cat	ZR 9000	Thundercat 137 ARS II w/ ATAC	ZR	Snowmobile	Trail	Carryover
317956	2021	Polaris	INDYÂ®	550 121	Snowmobile	2021	Polaris	INDYÂ®	550 121	INDYÂ®	Snowmobile	Performance	Carryover
317957	2021	Polaris	INDYÂ®	550 144	Snowmobile	2021	Polaris	INDYÂ®	550 144	INDYÂ®	Snowmobile	Performance	Carryover
317958	2021	Polaris	INDYÂ® 120	Base	Snowmobile	2021	Polaris	INDYÂ® 120	Base	INDYÂ®	Snowmobile	Youth	Carryover
318166	2021	Polaris	INDYÂ® Adventure	550 144	Snowmobile	2021	Polaris	INDYÂ® Adventure	550 144	INDYÂ®	Snowmobile	Touring	Carryover

HOW DO WE IMPLEMENT THIS?

Options

- Auto Care Association subscription with custom data mapping
- 3rd-Party data-transformation company with ACES/PIES
    - Opticat, PDM, etc.

Impact

- Enriched database to eliminate naming/year inconsistency
- Monthly data updates for new vehicles & fitment
- Possibly implement formatting standards to vendors

PROGRAM OVERVIEW

STEPS

1. Cleans Data

-Formats vendor file data

-Sets data up for the rest of the program

2. Matches Part #'s

-Matches vendor part # to WPS#

-Stock status

3. Novus Model Match

-Matches vendor name to Novus name

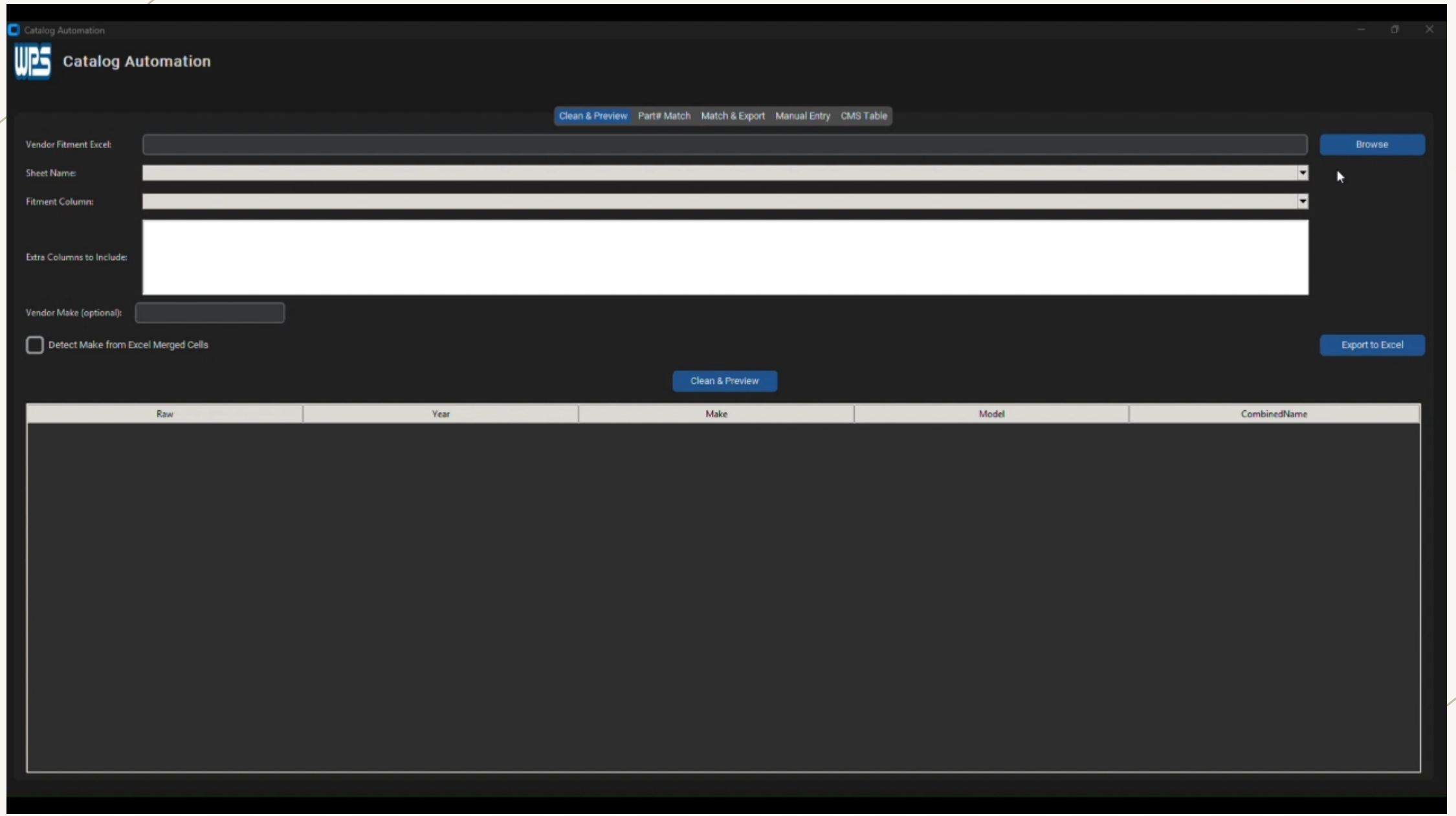
-Longest manual review

4. CMS Table Creation

-Formats data into CMS Table

-Truncates models

VIDEO APP DEMONSTRATION



NEXT STEPS & LEARNING RECAP

RECOMMENDATIONS

Data Standard

Data-Driven

Create data standard

ACES/PIES

Program Implementation

Start with snow then introduce new segments to the app

Monitor & Optimize

Adjust program and processes as new roadblocks are encountered

Communicate w/ Vendors

Two-way relationship

Formatted data = Faster turnover

KEY TAKEAWAYS

BALANCING LEARNING & DELIVERY

- Research new topics
- Implement these findings
- Provide a sufficient "product"

COMMUNICATION IS CRUCIAL

- Each department works together whether they realize it or not
- Always think of the bigger picture
- "Who will this decision affect?"

PROJECT MANAGEMENT

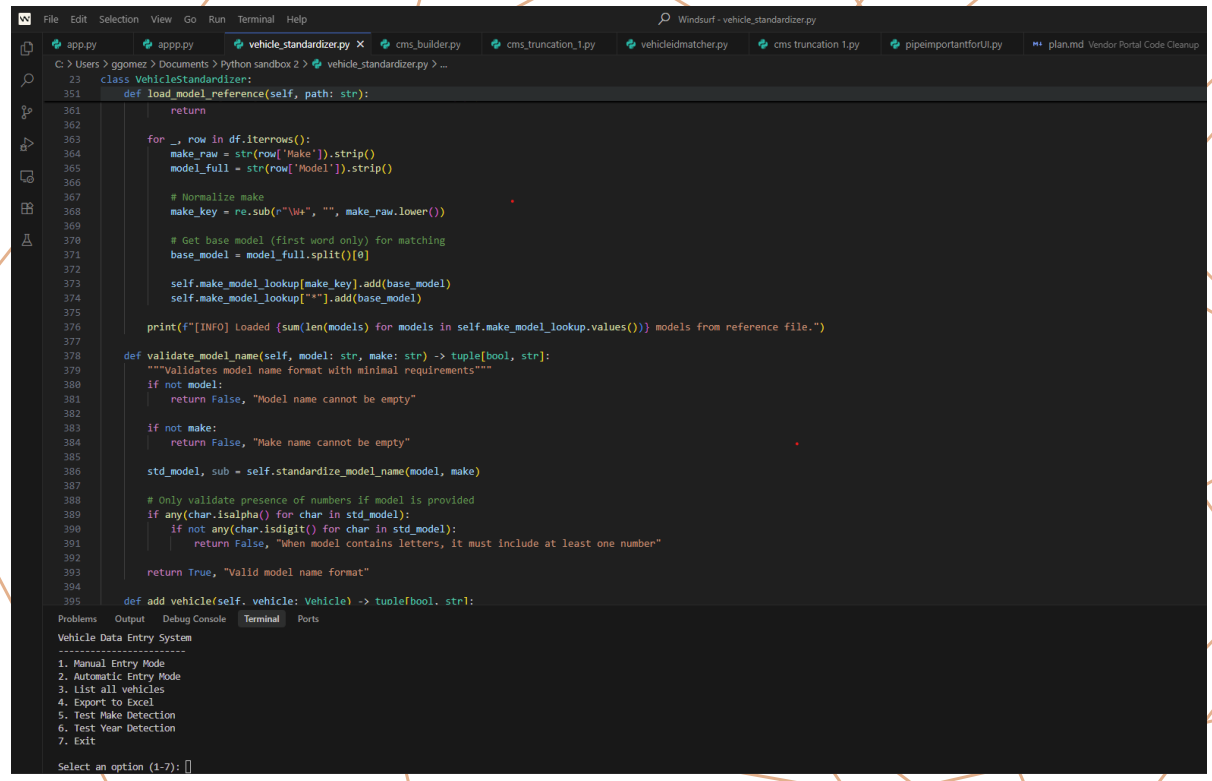
- Feedback/check-ins are essential
- Self-Leadership
- Scope tasks to meet deadlines

Questions?

PROGRAM SPECIFICATIONS

CATALOG APP CREATION AND DESIGN PROCESS

- Backend written entirely in python.
- Behind the scenes, system uses smart automation to:
  - Clean messy data, match products/verify fitment, build catalogs quickly, show everything in a simple interface.
- System requirements are low and can be run on existing company hardware



DATA CLEANER WEB-FITMENT

Module Specifications

- Designed to handle various formats and inconsistencies.
- Validates against a comprehensive database of 60+ manufacturers.
- Intelligent Parsing extracts year, make, model, sub-model information from a long string with irrelevant information attached.
- Applies consistent formatting.

Raw	Year	Make	Model	SubModel
'92 Suzuki Challenger SE: Rota:	1992	Suzuki	CHALLENGER	Se: Rotax 376
1992 Sea-Doo WaveRunner FX:	1992	Sea-Doo	WAVERUNNER	Fx: Rotax 125
'82 Yamaha Explorer: cc 662	1982	Yamaha	EXPLORER:	Cc 662
'80 Kawasaki KingQuad: Rotax	1980	Kawasaki	KINGQUAD:	Rotax 760
2016 Polaris Challenger SE: HP	2016	Polaris	CHALLENGER	Se: Hp 908
'95 Yamaha WaveRunner FX: c	1995	Yamaha	WAVERUNNER	Fx: Cc 206
'95 Sea-Doo TRX300EX: Rotax :	1995	Sea-Doo	TRX300EX:	Rotax 367
'81 Sea-Doo Challenger SE: cc	1981	Sea-Doo	CHALLENGER	Se: Cc 731
2018 Kawasaki Jet Ski: Rotax 59	2018	Kawasaki	JET	Ski: Rotax 598
2004 Sea-Doo SP: HP 430	2004	Sea-Doo	SP:	Hp 430
2002 Kawasaki Ranger: Rotax 5	2002	Kawasaki	RANGER:	Rotax 538
'91 Suzuki SP: HP 855	1991	Suzuki	SP:	Hp 855
2014 Honda WaveRunner FX: c	2014	Honda	WAVERUNNER	Fx: Cc 452
'89 Kawasaki KingQuad: Rotax	1989	Kawasaki	KINGQUAD:	Rotax 870
1987 Polaris Ranger: Rotax 367	1987	Polaris	RANGER:	Rotax 367

COMPARISON AND IMPACT

Manual Excel Cleaning

- Time Per record: ~ 30 seconds
- Initial Review: ~15 min
  - Sorting and identifying patterns
  - Creating standardization rules
- Data Cleaning: ~8 hours
  - Using excel functions
  - Manual corrections for special cases
- Quality Control: ~30 min
  - Spot checking
  - Cross-verifying entries
  - Fixing Errors
- Total Time: 8.5 hours

Automated Cleaner

- Total time: <1 Second
- Scalability: Handles 10,000 records in 8.23 seconds
- O(n) time complexity.
- 99.99% reduction In processing time
- Saves ~1 workday per 1,000 records.
- For 5,000 records/month saves ~45 workdays annually
- Error Reduction: Eliminates human error in an extremely repetitive and tedious task.

MATCHING AND CATALOG FUNCTIONS

Matching:

- Utilizes a lightweight but powerful character matching algorithm.
  - Token and semantic Sbert Matching.
- Double checks data to catch mistakes.

Catalog Creation:

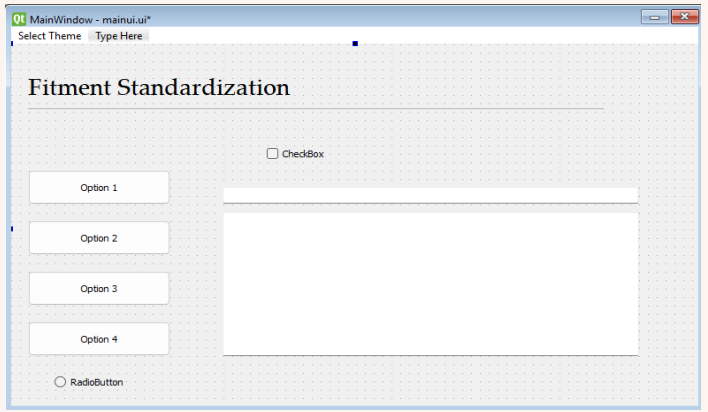
- Builds catalogs automatically.
- Groups related vehicles, handles formatting, and can handle large files with ease.

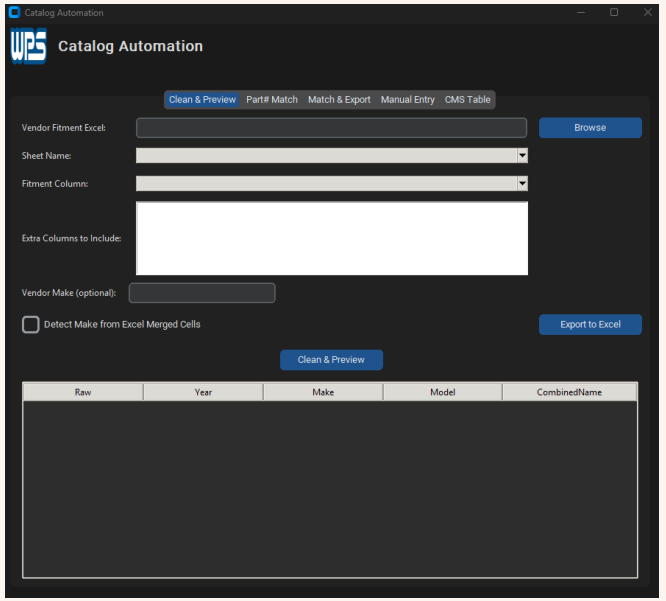
Advantages and Impacts

- Manual check ~ 5 seconds
- Per 1,000 lines if 20% return 100% matches
  - Saves 16.7 minutes of work
- Catalog creation ~ 15 to 30 min
  - Monthly 5.5 – 11 hours in work hours saved
  - Yearly 8 to 16 full workdays saved

USER-FRIENDLY INTERFACE

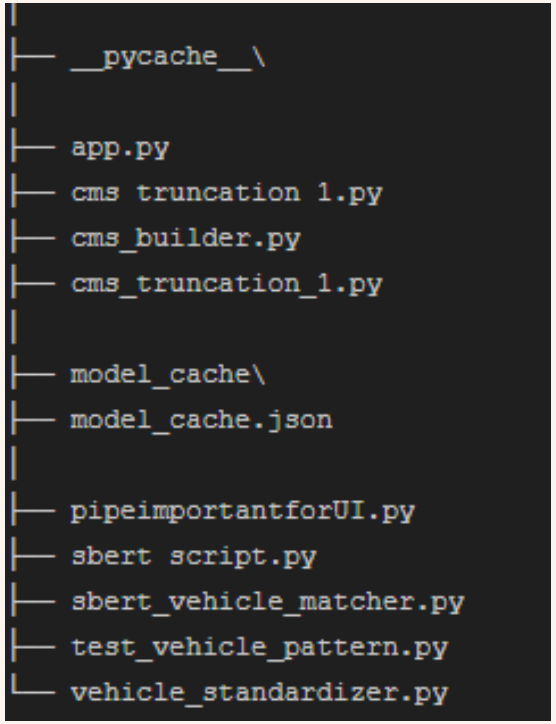
- The app is easy to use:
- Clear progress indicators
- Helpful error messages
- Keyboard shortcuts for power users
- Linear flow and top down flow makes it easy for user to move from start to finish.
  - Minimizes training time,
  - Minimizes mistakes,
  - Boosts confidence in the program





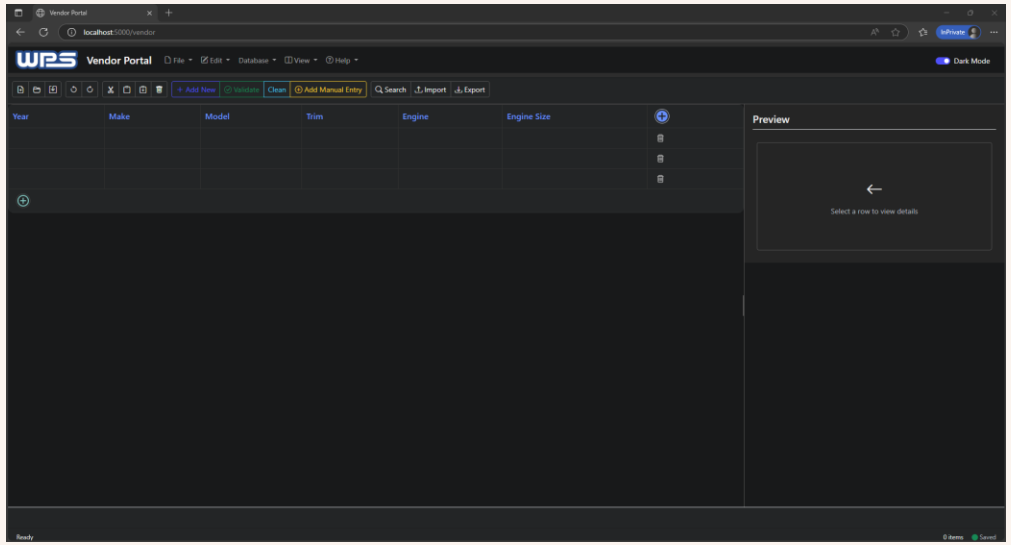
APP MAINTENANCE

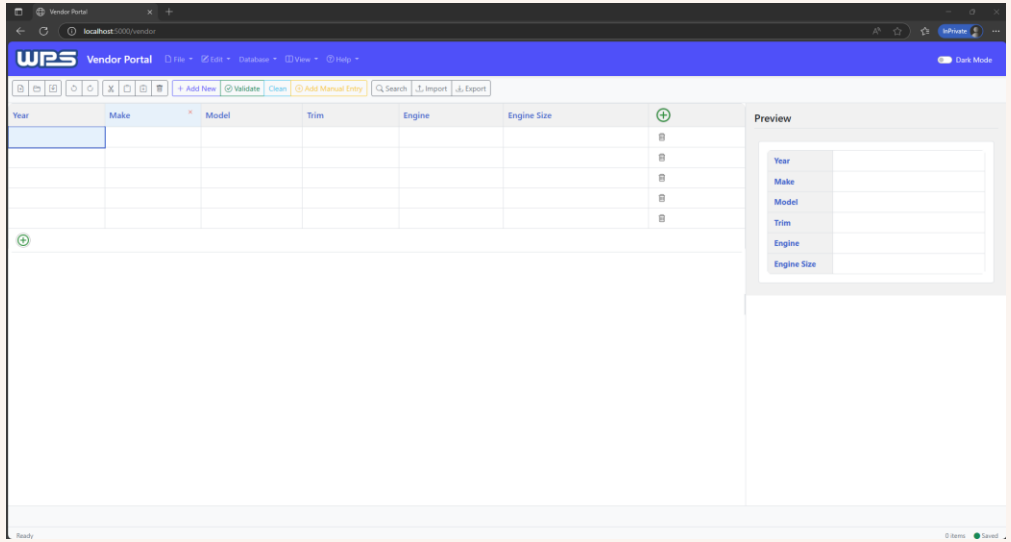
- Simple setup
  - Runs on standard tools: Python, Git
  - No expensive software required.
- Organized Codebase
  - Clear labels and file separation make updates fast and low risk.
- Future-Proof
  - Built using widely-used technologies and algorithms that are supported and scalable.

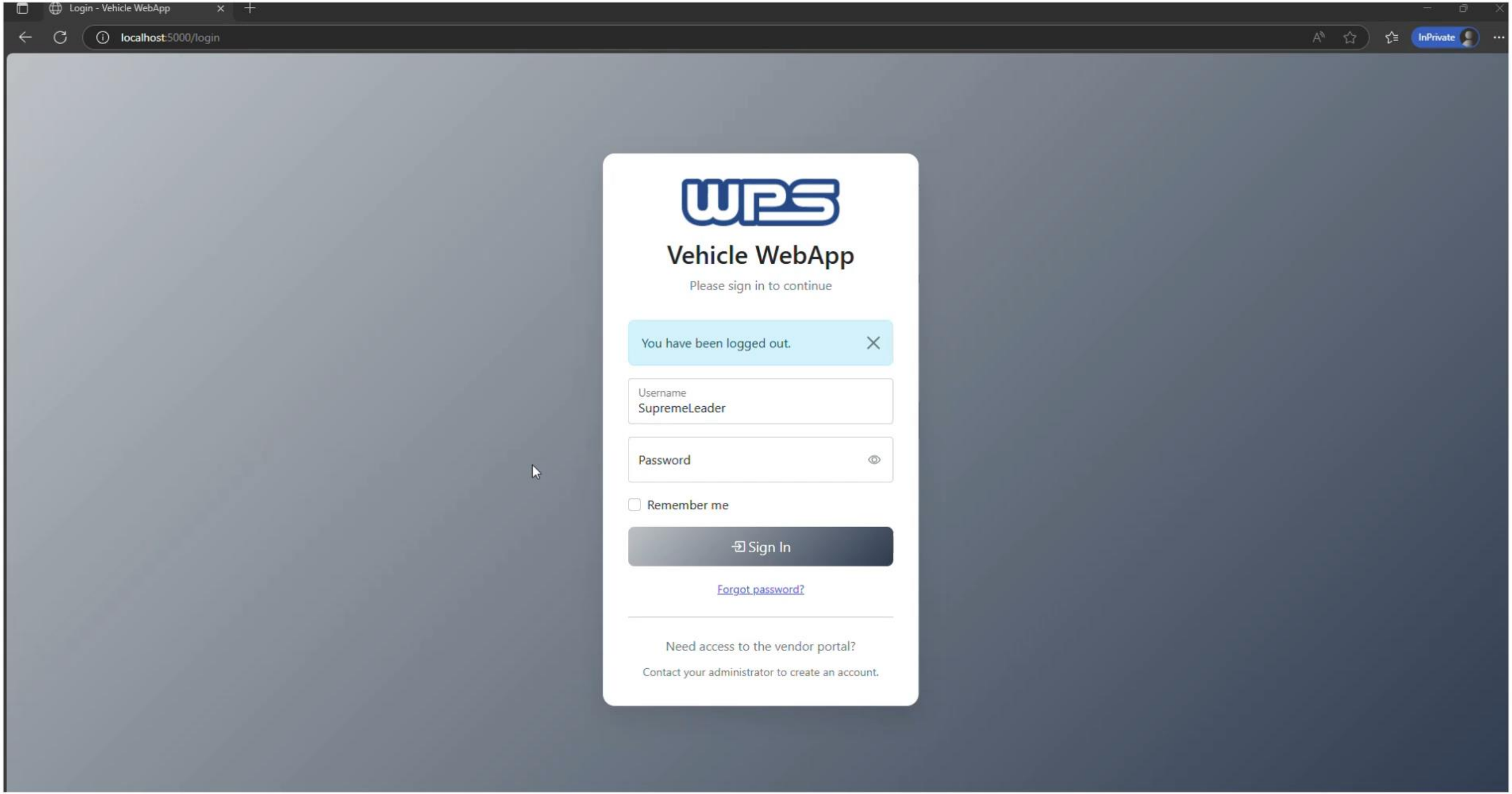


VENDOR PORTAL

- Allow vendors to fill out and upload their fitment data in a format that works for us.
- Exists as a web so that it can be easily accessible by anyone regardless of device.
- Smart uploads: Accepts only safe files types and sizes to prevent security risks.
- Automatic validation: Checks vendor data against our standards and known vehicle databases.
- Secure and Trackable: Every upload is logged for transparency and troubleshooting.
- Versatile and customizable
  - Can add and rename columns if a specific vendor has unique information that we need.






Login - Vehicle WebApp
localhost:5000/login
InPrivate
Vehicle WebApp
Please sign in to continue
You have been logged out.
Username
SupremeLeader
Password
Remember me
Sign In
Forgot password?
Need access to the vendor portal?
Contact your administrator to create an account.

CREATION AND BENEFITS

- Coded in 5 Programming Languages
  - Python, Javascript, CSS, HTML, and SQL
- Robust Security Features built in:
  - User Authentication, stored password encryption, role-based access control, Session management security, rate limiting, IP tracking and blocking, input validation, cache control, Database security, Cross-site request forgery protection, administrative security.

- Cleaner data from the Start
  - Reduces time to fix vendor errors
- Faster turnaround.
- Improved vendor accountability
  - With uploads and logs, vendors data quality can be measured over time.
- Scalable Collaboration.
  - As we grow more vendors can onboard without increasing internal workload.

RECOMMENDATIONS AND SUGGESTIONS

- Choose a reliable hosting platform: AWS, Microsoft Azure, DigitalOcean etc,
  - Register a domain name.
- Enable HTTPS (SSL/TLS) using free certificates from Let’s Encrypt or hosting provider.
- Implement Vendor Scoring & Quality assessment:
  - Implement feature to score vendors based on data quality, update frequency, and error rates.
- Frequently test both platforms for security vulnerabilities.
  - OWASP ZAPROXY
- Invest in better hardware for the data team to allow for faster and better development of programs or sites.

KEY TAKEAWAYS

- Data quality drives trust
  - Clean accurate data builds client confidence and strengthens our reputation.
- Technology is a competitive advantage
  - Investing in smart tools and automations helps us move faster and stay ahead of our competitors.
- Time saved is value gained
  - By reducing manual work, we save time, cut costs , and free our team to focus on higher-value tasks.