



IBMs AS400 - A Simple Analogy Explains Everything

Many people will look at the title of this article and think to themselves 'the AS/400 doesn't exist anymore'. Others will look at it and think 'hey, the forward slash between AS and 400 is missing'. All of them will be right of course. But very few of them will realize an 'AS400' is not 'the AS/400'. A simple analogy in plain English covering over 3 decades worth of IBM's adventures in the world of midrange computer systems can explain why.

By the way, the target audience for this article is made up of the CIOs, CTOs, IT Directors, developers and vendors who hear "AS400" and immediately think "green screen". That single thought has wasted millions of dollars on failed migrations and cost many of C-Level people their jobs.

It's not hard to see why they'd think the thought though. There are many articles out there describing the platform. Some go into a lot of detail about its evolution, complete with very detailed tables -

<https://history-computer.com/ModernComputer/Software/OS400.html>

https://wiki.midrange.com/index.php/History_of_OS/400

Some take a more conversational tone -

<https://seasoft.com/blog/ibm-i-a-history-in-numbers/>

<https://iageco.com/briefly-basics-history-as400/>

What none of them do is paint a simple, easy to remember picture for readers. Not even the excellent webinar IBM's Chief Architect for the platform, Steve Will, put together for a presentation with HelpSystems -

<https://www.helpsystems.com/resources/on-demand-webinars/ibm-i-its-not-just-as400-steve-will>

Since roughly 70% of people are visual learners this has been an unfortunate omission. Hopefully the analogy below will provide you with that picture.

Let's start with a single piece of 8½" by 11" inch piece of paper. If you've ever had to print an essay or term paper then it should be easy to visualize. If by some stroke of luck you've never had to print either of those things then just look at your desk. There's probably a report sitting on it using paper that size. (Office Depot and Staples sell pallets of the stuff every day so there's bound to be something using that size paper near you.)

Whenever it's used for something it always has blank margins on both sides of the text. For the sake of this analogy let's say our analogy is going to include a 1-inch margin on each side. That leaves 6½ inches of usable space for text.

The first AS/400 came out in 1988. RPG III was the main programming language used on it so imagine everything the language could do took up the first 100 pages of our analogy (all of it inside the margins). RPG III could also be called RPG/400 at this point because of some hardware changes. The system also came with database and display files, the former being DB2/400 and the latter being green screens. These things have to be included in the first 100 pages since the platform couldn't do anything without them. For the sake of the analogy we're not going to leave the margins blank though. We'll put everything the operating system (OS/400) and hardware can do inside them.

In 1990 RPG400 came out and didn't cause much of a stir among RPG programmers. If you want to you can add another 20 pages to the analogy to keep it clean.

In 1994 the next version of the AS/400 came out, the AS/400 Advanced Series. Along with it came the next major enhancement to RPG. It had various names - RPG IV, ILE RPG, RPG/ILE, and RPGLE. When more enhancements were added to it in 2001 even more labels were added for it - RPG IV and RPG5. Most programmers used, and still use, the RPGLE label for it so that's what I'll do. Add another 100 pages to the analogy to cover everything it can do. And then add another 200 because there are technically two flavors of RPGLE, the OPM version and the ILE version. (Most companies use the OPM flavor.) Here are a couple of descriptions of the differences if you're interested -

http://midwareservices.com/RPGIV/opm_vs_ile.htm

https://www.ibm.com/support/knowledgecenter/ssw_ibm_i_72/ilec/history.htm

At this point all of the pages in the analogy still hold true. It's up to 420 pages now and what could be done way back on page 1 in 1998 can still be done thanks to the miracle of backward compatibility.

In 2000 the name of the platform was changed to eServer iSeries. If you're looking for the biggest mistake IBM ever made with the system it happened right here.

The IT world typically uses a two-part naming convention. The first part ties the iterations together and the second part names the iteration. Hence Windows 3.1, Windows Vista, Windows XP, Windows 7, and Windows 10. Or JDE World A7.2, JDE World A7.3, JDE World 8.1. Even the AS/400's operating system used this naming convention - OS/400 V4R5, OS/400 V5R1, OS/400 V5R2.

IBM had its reasons for breaking with the convention of course but the unintended consequence was that people called the platform either an iSeries or the AS400. Notice the lack of a forwards slash in AS400. This is when the name went from being attached to a specific machine to becoming a generic identifier for the iSeries and future evolutions of the platform. (Although some might argue that it became a generic label even earlier when it began using 'AS' to mean 'Advanced System' and 'Advanced Series' in addition to 'Application System'. Using any of the 24 other letters in the alphabet to create new acronyms would have made things less confusing.)

In 2004 IBM changed the name of the operating system from OS/400 to i5/OS (we're talking about changes in the margins of our analogy here). People continued to use the generic AS400 label.

In 2006 IBM changed the name of the system from iSeries to System i. People continued to use the generic AS400 label.

In 2008 IBM changed the name of the operating system from i5 to IBM i on Power Systems. People continued to use the generic AS400 label.

About 80% of the users and 65% of the C-Level people still continue to use the generic AS400 label to this day. (The percents come from a survey ALL400s ran in 2018 - I lowered them a bit to take into account people who started using the IBM i label in the interim.)

If you want to know why I used "AS400" in the title of this article, here's the reason. The "AS400" isn't an "AS/400", it's the generic label that ties all of IBM's midrange platforms together and what people mean when they say "AS400" today. IBM doesn't like it of course, but the second paragraph of this article gives several other examples of companies it's happened to -

https://all400s.com/assets/What_is_an_AS400.pdf

Now back to our analogy.

After IBM changed the name of the system to iSeries back in 2000 (and continued to call the operating system OS/400 by the way), it came out with a version of RPG in 2001 that allowed free-format calculation specs, meaning there was no need to pay any attention to what was in what column while you were in the /Free zone. As the language evolved and allowed more and more "Free" statements it became known as RPG/Free. It comes in two flavors like RPG IV, OPM and ILE, and just like with RPG IV most companies are using the OPM flavor.

We were at 420 page before this development, still all within the 6½ inches on the page between our margins. Another 200 pages need to be added to cover all of these enhancements to RPG. So we're up to 620 pages and what was true on page 1 is still true. And green screens are still all over the place making it look like nothing has really changed.

That's not the worst of it though.

The hardware itself made some huge leaps between day 1 in 1988 and today. For instance, the platform could be partitioned making it possible to run Linux on the same box. AIX, IBM's version of Unix, could already be run on it too in the PASE environment thanks to some earlier changes too. There isn't enough room in 1-inch margins to cover these changes so we have to move to non-standard sheets of paper and add a foot on each side to include them.

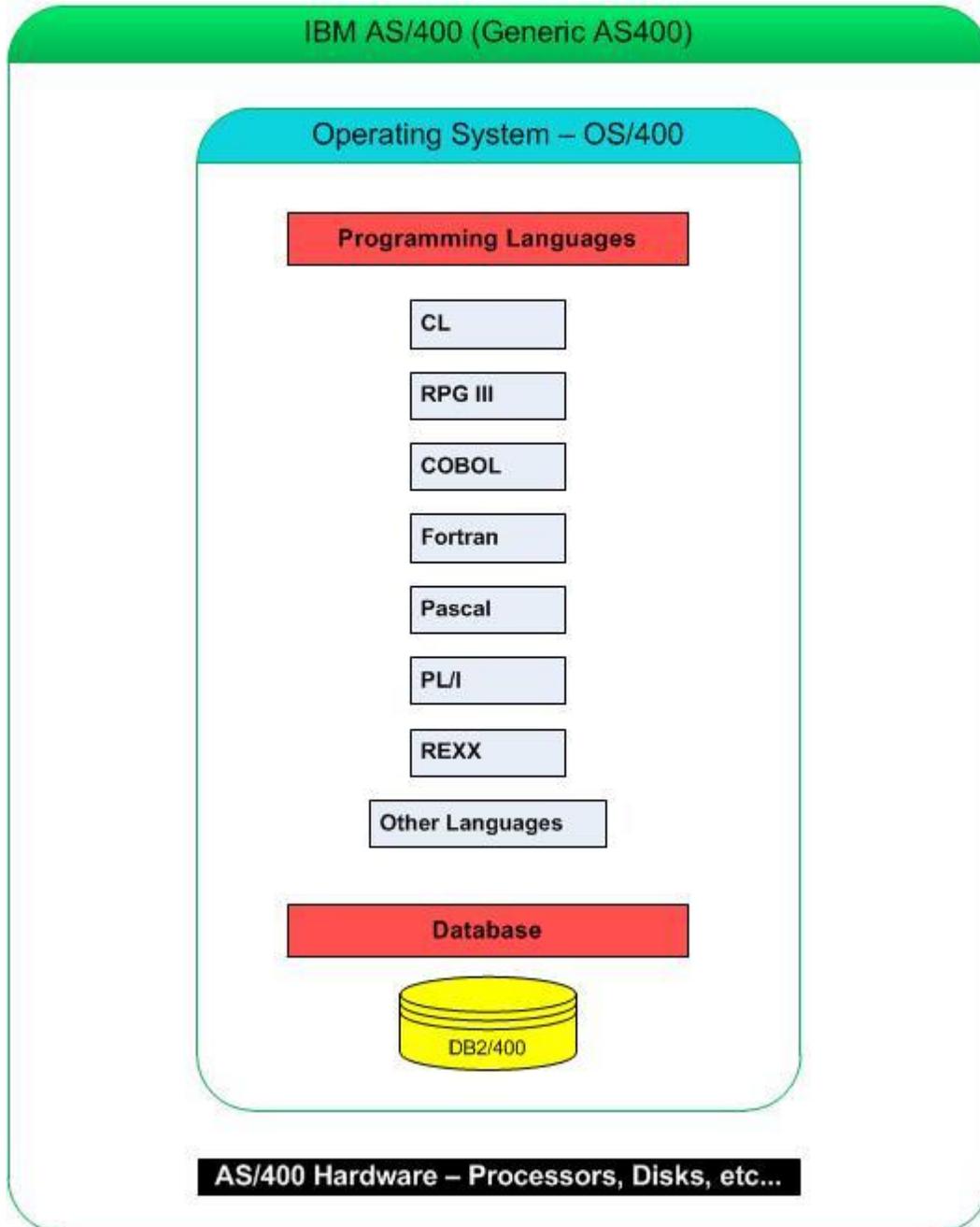
At the same time, the architecture was changed to allow more and more things to run on it. Programming languages like SQL, Java, Javascript, PHP, JSON, Python, Perl, Pascal, C, C++ and Ruby can all run it, along with several other programming languages.

That fact is invisible to the decision-makers and developers who hear "AS400" and immediately think "green screen", "legacy system", "old tech" when they hear the label. All they know is RPG runs on it and it has green screens. Thanks to that lack of knowledge most of each sheet of paper, which is now 3 feet 8½ inches wide, remains unseen. "AS400" only means the 6½ inches of usable space inside the margins of the 620-page book (including the green screens). With the narrowest possible picture of the platform in mind they waste millions of dollars trying to migrate off of the platform to

get something they already have. And as I said earlier, they often do so at the cost of their own job.

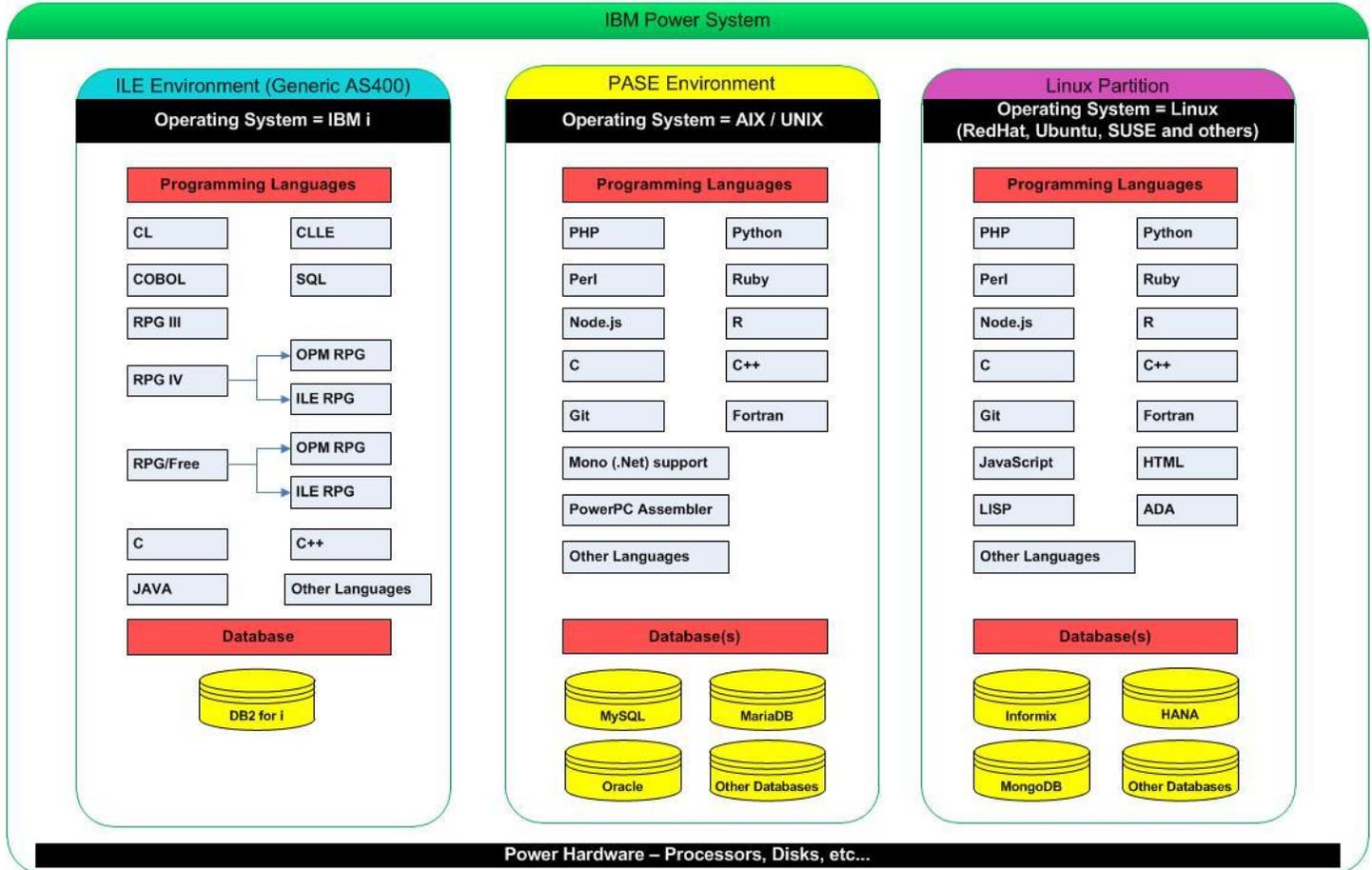
Here's a picture of what they see -

System Evolution – 1988 Version



Decision-makers and developers who are more familiar with the system have a totally different picture in mind when they hear "AS400". They know it really looks more like this picture in its' current incarnation -

System Evolution – 2020 Version



If you look for the term 'Generic AS400' in the 2nd picture you'll see what people mean when they say 'AS400' in an article, job ad, or vendor advertisement these days.

In the paragraph above when I said decision-makers who hear "AS400" and immediately think "green screen" and "legacy system" tend to make costly mistakes I should have pointed out that these people will usually be working at small to mid-sized companies. When you get up into the Fortune 500 companies you'll find many of them are using the platform because their decision-makers see the 2nd picture when they hear 'AS400'. It helps that their companies are so large they're used to working in hybrid IT departments. It also helps that they know the system is the most securable platform on the planet but that's a topic for another time.

Since 'many of them' is kind of ambiguous here's a list of 293 Fortune 500 companies who have been confirmed as being on the platform during the last 12 months (regardless of whether you use the generic 'AS400' or more accurate 'IBM i on Power Systems' label).

- Avon (New Avon)
- 3M
- Abbott Laboratories
- ABM Industries, Inc.
- ADP

Advance Auto Parts
AFLAC, Inc.
Agco Corporation
AIG Insurance (American International Group)
Alcoa, Inc.
Altria Group
Ameren Corporation
American Airlines Group, Inc
American Axle & Manufacturing, Inc. (Grede Holdings)
American Express Company
Ameriprise Financial Services, Inc.
Amerisourcebergen Corporation
Amphenol Corporation
Anixter International
Anthem Companies, Inc. ((Blue Cross Blue Shield Of Georgia))
Archer Daniels Midland Company
Arconic (Arconic Power and Propulsion)
Arrow Electronics, Inc.
Arthur J Gallagher & Co
Ascena Retail Group, Inc.
Autozone
Avery Dennison Corp
Avis Budget Group
Avnet, Inc.
Ball Corporation (Ball-Incon Glass Packaging)
Bank Of America
Bank of New York Mellon
Baxter International, Inc.
BB&T Corp (location after Suntrust merger)
Beacon Roofing Supply, Inc.
Becton Dickinson
Bed, Bath & Beyond
Berry Plastics Corporation (Berry Global Group Inc)
Best Buy Co, Inc.
Booz Allen Hamilton Holding
BorgWarner Automotive
Boston Scientific Corporation
Bristol-Myers Squibb Co
C.H. Robinson Worldwide, Inc.
Caesars Entertainment Corp
Campbells Soup Company
Cardinal Health
Caterpillar, Inc.
CBRE Group, Inc.
CBS Corporation
CDW, Inc.
Celanese Corporation
Celgene Corporation
Centene Corporation (Centene Healthnet Federal Services)
Charter Communications, Inc.
Chevron USA
CHS
Cigna Corporation
Cintas Coporation
Cisco Systems, Inc.
Citigroup, Inc. (Citi)
Citizens Financial Group, Inc.
Coca-Cola Enterprises (Coca-Cola Company; Coca-Cola North America)
Cognizant Technology Solutions
Colgate-Palmolive Company
Comcast Corporation

Community Health Systems (CHS Corporate)
ConAgra Foods (Conagra Brands)
Constellation Brands, Inc.
Core-Mark Holding Company
Corning
Costco Wholesale Corporation
Crown Holdings (Crown Cork and, Seal)
Cummins Global Logistics
CVS Health (Caremark))
D.R. Horton, Inc.
Dana Corporation
DaVita
Delta Air Lines, Inc.
Dick's Sporting Goods, Inc.
Dillard's, Inc.
Discover Financial Services
Dollar General Corporation
Dollar Tree Stores, Inc.
Dr Pepper, Snapple Group (Keurig Dr Pepper (KDP))
Duke Energy Corporation
DuPont (Merged with Dow Chemical)
DXC Technology (Computer Sciences Corporation, CSC)
Eastman Chemical Company
Ebay Enterprise
Ecolab, Inc.
Eli Lilly & Company
EMCOR Group
Emerson Electric Co
Entergy Corporation
EOG Resources, Inc.
Erie Insurance Group
Estee Lauder Companies, Inc.
Eversource Energy
Expedia Group
ExxonMobil Corp
Fannie Mae
FedEx Services (FedEx Corporation; FedEx Logistics)
Fidelity National Financial, Inc.
First American Financial Corporation
First Data Corporation
Fiserv, Inc.
Ford Motor Company
Fortive
Freddie Mac
Frontier Communications
Gamestop Corporation
General Electric Company
General Motors (North America)
Genuine Parts Company (NAPA)
Genworth Financial, Inc.
Goldman Sachs & Company
Goodyear Tire & Rubber Co
Graphic Packaging International
Guardian Life Insurance Company Of America
Hanesbrands, Inc.
Harley-Davidson, Inc.
Hartford Financial Services Group, Inc.
HCA, Inc. (HCA Healthcare Inc)
Henry Schein - Global Co.
Hershey
Home Depot, Inc.

Honeywell International
Hormel Foods Corporation
Illinois Tool Works
Insight Enterprises, Inc.
International Paper Company
Interpublic Group of Companies, Inc.
Intuit, Inc.
IQVIA Holdings
J.B. Hunt Transport Services, Inc.
J.P. Morgan Chase & Co
Jabil Circuit, Inc.
Jefferies Financial Group
Johnson & Johnson
Johnson Controls, Inc.
Jones Lang LaSalle (JLL)
Kelly Services, Inc.
KeyBank (KeyCorp)
Kimberly Clark Corporation
Kinder Morgan, Inc.
Kohls Department Stores
Kraft Heinz Company
Kroger Company
L Brands, Inc.
Laboratory Corporation of America (LabCorp)
Las Vegas Sands Corp
Lear Corporation
Leidos Holdings, Inc.
Lennar Corporation (Lennar Homes)
Levi Strauss & Co.
Liberty Mutual Insurance
Lincoln National Corporation
Live Nation Entertainment
LKQ Auto Parts (LKQ Corporation)
Lowe's Companies, Inc.
M&T Bank Corporation
Magellan Health, Inc.
Marathon Oil Company
Marriott International
Marsh & McLennan Companies, Inc.
Massachusetts Mutual Life Insurance Company
MasterCard Incorporated
McDonald's Corporate
Mckesson Corporation
Merck & Co, Inc.
MetLife, Inc.
MGM Resorts International
Mohawk Industres
Molina Healthcare
Morgan, Stanley
Motorola Solutions, Inc.
Murphy USA, Inc.
Mutual of Omaha Insurance Company
National Oilwell Varco, Inc.
Navient (Formerly Sallie Mae)
New York Life Insurance
Newell Brands
NextEra Energy, Inc
NGL Energy Partners LP
Nike INC (Converse)
Nordstrom, Inc.
Norfolk Southern Railway

Northern Trust Corporation
Northrop Grumman Corporation
Northwestern Mutual Life Insurance Company
NRG Energy, Inc.
Nucor Steel (Ambassador Steel)
Occidental Petroleum Corporation
Office Depot, Inc.
O'Reilly Auto Parts (O'Reilly Automotive)
Oshkosh Corporation
Owens & Minor
Owens Corning
Owens-Illinois, Inc.
Paccar, Inc.
Packaging Corporation of America (PCA)
Parker-Hannifin Corporation
Penske Automotive Group, Inc.
Pepsi-Cola, Inc.
Performance Food Group Company (Performance Foodservice)
Pfizer, Inc.
Pioneer Natural Resources
PNC Financial Services Group, Inc.
Polaris Industries, Inc.
Post Holdings (Premier Nutrition Corporation (PNC))
PPG Industries, Inc.
Praxair, Inc.
Progressive Insurance
Prudential Financial, Inc.
PVH Corp - Island Pacific, Tommy Hilfiger
Qualcomm, Inc.
Quanta Services
Quest Diagnostics, Inc.
R.R. Donnelley & Sons
Ralph Lauren
Raymond James & Associates, Inc. (Raymond James Financial)
Regions Financial Corporation
Reinsurance Group Of America Incorporated
Republic Services, Inc.
Rite Aid Corporation
Robert Half International, Inc.
Rockwell Automation, Inc.
Rockwell Collins Aerospace (formerly B/E Aerospace)
Ryder System, Inc. (Ryder Logistics and Transportation; Ryder Trucks; Ryder Last Mile)
Salesforce Com, Inc.
Seaboard Corporation (Seaboard Marine)
Sherwin Williams Company
Simon Property Group, Inc.
SpartanNash Company
Stanley Black & Decker
Starbucks Corporation
State Farm Insurance Companies
State Street Corporation
Stryker Corporation
SunTrust Banks, Inc.
Supervalu, Inc.
Sysco Corporation
Tapestry, Inc. (Formerly known as Coach, Inc.)
Target Corporation
TechData Corporation
Tenet Healthcare Corp
Tenneco, Inc.
Tesla

Texas Instruments, Inc.
Textron, Inc.
Thermo Fisher Scientific/Lab Equipment
Thrivent Financial for Lutherans, Investment Arm
TJX Companies (T.J. Maxx, Marshalls, Homegoods)
Toll Brothers
Travelers Companies, Inc.
TreeHouse Foods
U.S. Bank (U.S. Bancorp)
U.S. Foods
Ulta Beauty
United Natural Foods, Inc.
United Parcel Service, Inc.
United Rentals, Inc.
United States Steel
United Technologies Corporation
UnitedHealth Group (OptumRx)
Univar USA, Inc.
Universal Health Services, Inc. (UHS)
Unum Group
Veritiv Corporation (Unisource)
Verizon Communications, Inc.
VF Corporation (Wrangler Jeans)
Viacom, Inc.
Voya Financial, Inc.
W.W. Grainger
Walmart Stores, Inc.
Waste Management, Inc.
Wellcare Health Plans, Inc.
Wells Fargo Bank
Wesco Distribution, Inc. (Wesco International)
Western Union Company
Westlake Chemical Corporation
WestRock Company
Weyerhaeuser Company
Whirlpool Corporation
Williams-Sonoma, Inc.
Windstream Communications (Windstream Holdings)
Wynne Resorts
Xcel Energy, Inc.
Xerox Corporation
XPO Logistics
Yum Brands (Pizza Hut, KFC, Taco Bell)
Zimmer Biomet, Inc.

If the ones we confirmed as using it in 2018 are still on it then that would add these 35 Fortune 500 companies to the total. (Another 72 confirmed prior to 2018 were on the platform at some point too - they're just not included here because we haven't been able to verify that they're still on it.)

AbbVie
AECOM
Air Products and Chemicals
AK Steel Armco, Inc.
American Electric Power Company, Inc.
Ashland
Chesapeake Energy Corporation
Danaher Corporation
DCP Midstream
Delek US Holdings, Inc.
Devon Energy Corporation

EnLink Midstream
Expeditors International of Washington, Inc.
Gilead Sciences
HD Supply
Hertz Corporation
Humana Insurance
INTL FCStone, Inc.
J.M. Smucker Company
Land O'Lakes, Inc.
Marathon Petroleum Corp (MarkWest Energy Partners, L.P)
Markel Corporation
Masco Cabinetry
Mondelēz International
Mosaic Company, The
Nationwide Insurance
Navistar International Corporation
Olin Corporation
Ross Stores
Synchrony Financial
TIAA-CREF
UGI Corporation
Walt Disney Company
Western Refining, Inc.
World Fuel Services
Zoetis, Inc.

In addition to the Fortune 500 companies shown, over 100,000 other companies are using IBM i on Power Systems (or what's known generically as an 'AS400'). Most of these other companies are only using the ILE Environment on the Power System but there are thousands of other companies who are only using the PASE (AIX) environment, and thousands more who are only using the Linux on Power environment. It's almost impossible to get an accurate count of all of these companies. Even if you were able to it wouldn't be a complete count because you'd still have to find out how many companies are mixing and matching environments and then add them to the count.

So if you're a decision-maker at your company and someone says you should migrate off of the platform to one that's more 'modern' you might want to stop and think a little bit about it before putting your job at risk. Ask whoever's pushing you to migrate off of it why your IT department can't make it work for you when at least 329 Fortune 500 companies, who can afford to buy the most 'modern' machines out there, are making it work for them.

The answer is they're really running IBM i on Power Systems and using all 620 pages of it, including the extra 3 feet in the margins, and just calling it by its generic name, 'AS400'. The difference between their company and yours is that you're running the same IBM i on Power Systems but your company isn't using anything from the extra 3 feet in the margins.

You might also want to ask whoever brings it up why they don't know that.

Note 1: The two pictures of fire tornadoes at the top of this article are another way of illustrating its main point. The one on the left shows what people see when they think of the 'AS400' as just a legacy, green screen computer system. The one on the right shows what people see when they know what it can really do.

Note 2: This article was brought to you by the ALL400s project. The project also provides a free, information-sharing website, <https://all400s.com/>, to help the the AS400 ecosystem - companies who use the system, people who work on it, and vendors who support it - stay connected and continue to thrive.