

# **SQL and Data Management**

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Customer #78

## 1. Using data for your client tickers from the view you created in step2 : what is the most recent 12 months, 18 months, 24 months return for each of the securities (and for the entire portfolio)?

### SQL Code Each security

```

420 -- Creating last 12m, 18m, 24m returns for Portfolio
421 CREATE VIEW F5_returns AS
422 SELECT v.ticker, v.date, (x+y-y*p0)/p0 AS discrete_ror
423   FROM
424   ( SELECT p.ticker, p.date, p.value AS p1, LAG(p.value, 1) OVER(PARTITION BY ticker ORDER BY date) AS p0
425     FROM (
426       SELECT c.customer_id, c.account_id, c
427         INNER JOIN account_dim a
428           ON c.customer_id = a.customer_id
429         INNER JOIN holder_dim h
430           ON c.account_id = h.account_id
431         INNER JOIN security_masterlist s
432           USING (ticker)
433         INNER JOIN pricing_daily_nw p
434           USING (ticker)
435         WHERE c.customer_id = 78
436         AND p.price_type = 'Adjusted'
437       ) y
438     ) y1
439   -- view 12m return
440   SELECT ticker, date, discrete_ror AS returns_12m
441   FROM F5_returns
442   AND date > '2021-09-01'
443   WHERE date < '2021-09-01'
444   GROUP BY ticker
445 ;
446
447   -- view 18m return
448   SELECT ticker, date, discrete_ror AS returns_18m
449   FROM F5_returns
450   AND date > '2021-03-01'
451   GROUP BY ticker
452 ;
453
454   -- view 24m return
455   SELECT ticker, date, discrete_ror AS returns_24m
456   FROM F5_returns
457   AND date > '2020-09-01'
458   GROUP BY ticker
459 ;

```

### Results Each Security

ticker	date	returns_12m	ticker	date	returns_12m	ticker	date	returns_12m
AAAU	2021-09-02	-0.0022160112031030096	IBM	2021-09-02	0.005096800875114614	MSOS	2021-09-02	0.002/69230/692308/4
AEP	2021-09-02	0.004751401628767877	IEF	2021-09-02	0.001951055009631801	MSVX	2021-09-02	0.0012762990094524473
AMP	2021-09-02	0.006096800312869563	IUSB	2021-09-02	0.000930107934457271	MUB	2021-09-02	-0.00025643770625758343
ANSS	2021-09-02	-0.004485769899398894	JNJ	2021-09-02	0.006849221317104315	NOW	2021-09-02	0.01453473394540897
APH	2021-09-02	0.0065495764512567434	KMLM	2021-09-02	0.0071212302859370216	POTX	2021-09-02	0.02439020948154265
AVB	2021-09-02	0.01805630868514691	KO	2021-09-02	0.001411159365881594	QAI	2021-09-02	0.0003092041824795102
BAR	2021-09-02	-0.00277321160664838	KRBN	2021-09-02	0.015680290989680722	RINF	2021-09-02	-0.004392052578788945
BK	2021-09-02	-0.001654324063271958	LBAY	2021-09-02	0.007302987426984848	SCHP	2021-09-02	0.00047581261093146144
BND	2021-09-02	0.0013898190307839264	LOW	2021-09-02	0.013370679534706895	SHV	2021-09-02	0.00009052444199482044
BSV	2021-09-02	0.0001215789701241623	MARB	2021-09-02	0.00010178026449643538	SHY	2021-09-02	0
BTLA	2021-09-02	0.001168790128703073	MJ	2021-09-02	0.019975791607084646	SIVR	2021-09-02	-0.010300429626627814
C	2021-09-02	0.0026645157034135033	MPC	2021-09-02	0.011353749641020629	SLV	2021-09-02	-0.0102817161250909873
CLX	2021-09-02	-0.004683967359969228	MSOS	2021-09-02	0.002769230769230874	SNOW	2021-09-02	0.019500452509816534
CNBS	2021-09-02	0.010915946843853792	MSVX	2021-09-02	0.0012762990094524473	THCX	2021-09-02	0.010973936899862385
COST	2021-09-02	0.00974761672917497	MUB	2021-09-02	-0.00025643770625758343	TIP	2021-09-02	0.000384230173005668
DBC	2021-09-02	0.011524305919329564	NOW	2021-09-02	0.014534873394540897	TLT	2021-09-02	0.004365532619480224
DBMF	2021-09-02	-0.014851810794772598	POTX	2021-09-02	0.02439020948154265	TTWO	2021-09-02	0.0006175878732978615
DJP	2021-09-02	0.008673653776653358	QAI	2021-09-02	0.0003092041824795102	UNG	2021-09-02	0.005590124223602318
EMB	2021-09-02	0.00273527879055074	RINF	2021-09-02	-0.004392052578788945	UPAR	2021-09-02	(NULL)
EMR	2021-09-02	0.015857703383036124	SCHP	2021-09-02	0.0047581261093146144	USO	2021-09-02	0.021281055706235276
FLSP	2021-09-02	-0.0024407810225648566	SHV	2021-09-02	0.00009052444199482044	UVIX	2021-09-02	(NULL)
FLT	2021-09-02	-0.00492680616198772	SHY	2021-09-02	0	VAMO	2021-09-02	0.008180128932228794
FMF	2021-09-02	-0.004169220903571166	SIVR	2021-09-02	-0.01030042962627814	VCSH	2021-09-02	-0.00012095249273788586
FTGC	2021-09-02	-0.00042156471010909038	SLV	2021-09-02	-0.0102817161250909873	VGSH	2021-09-02	0
GIGB	2021-09-02	0.0014328428593655739	SNOW	2021-09-02	0.019500452509816534	VLO	2021-09-02	0.019546425107399665
GLD	2021-09-02	-0.002651720730436997	THCX	2021-09-02	0.010973936899862385	VTIP	2021-09-02	0.0007602530278128584
GOOG	2021-09-02	-0.011128488745645504	TIP	2021-09-02	0.0003884230173005668	VTR	2021-09-02	0.0024761150307640247
GOVT	2021-09-02	0.001118912891568133	TLT	2021-09-02	0.004365532619480224	WAB	2021-09-02	0.021761185810823466
GSG	2021-09-02	0.013257512626262615	TTWO	2021-09-02	0.0006175878732978615	WM	2021-09-02	0.0034453501768633207
HDG	2021-09-02	0.0013402067777140113	UNG	2021-09-02	0.005590124223602318	WTMF	2021-09-02	0.0036258968082457815
HLT	2021-09-02	-0.0074209962749580425	UPAR	2021-09-02	(NULL)	YOLO	2021-09-02	0.00394147856500913
IAMU	2021-09-02	-0.0019856598099575345	USO	2021-09-02	0.021281055706238276	ZTS	2021-09-02	0.013466441065155953

12M

ticker	date	returns_18m	ticker	date	returns_18m	ticker	date	returns_18m
AAAU	2021-03-02	0.004662004662004562	GOVT	2021-03-02	0.0007546929552084066	QAI	ZU21-U3-U2	-0.0052631359993921345
AEP	2021-03-02	-0.00338939799189402	GSG	2021-03-02	-0.0007092198581560132	RINF	2021-03-02	0
AMP	2021-03-02	-0.014361847637313857	HDG	2021-03-02	-0.004584470089187061	SCHP	2021-03-02	0.003601341639848523
ANSS	2021-03-02	-0.0282569079883667	HLT	2021-03-02	0.003959281496482321	SHV	2021-03-02	-0.00009041079597782897
APH	2021-03-02	-0.007156073338153064	IAUM	2021-03-02	(NULL)	SHY	2021-03-02	0.0023170657932380503
AVB	2021-03-02	0.0067789247644204215	IBM	2021-03-02	-0.003395743418190502	SIVR	2021-03-02	0.007033997655334104
BAR	2021-03-02	0.005841004331717208	IEF	2021-03-02	0.001817321915487711	SLV	2021-03-02	0.008130040650406433
BK	2021-03-02	-0.0018315310219323996	IGSB	2021-03-02	0.0005472891235725674	SNOW	2021-03-02	-0.005768478983759227
BND	2021-03-02	-0.00011672540522158017	IUSB	2021-03-02	0.00018747076316649066	THCX	2021-03-02	0.004287780932204537
BSV	2021-03-02	0.00048497153879125884	JNJ	2021-03-02	-0.001882958796747901	TIP	2021-03-02	0.004066791746390751
BTAL	2021-03-02	0.001752277935030501	KMLM	2021-03-02	0.00167472312686999	TLT	2021-03-02	0.00007098099956576967
C	2021-03-02	-0.0090595845959568828	KO	2021-03-02	0.004007966670884464	TTWO	2021-03-02	0.0038410296693682866
CLX	2021-03-02	-0.004172044610470827	KRBN	2021-03-02	0.01381979784218272	UNG	2021-03-02	0.0260366441658632
CNBS	2021-03-02	-0.01804939835338812	LBAY	2021-03-02	0.005550558103627177	UPAR	2021-03-02	(NULL)
COST	2021-03-02	-0.009976711682474446	LOW	2021-03-02	0.006854270810246645	USO	2021-03-02	-0.013054138574095474
DBC	2021-03-02	0.004219409282700439	MARB	2021-03-02	0.0005640801803129175	UVIX	2021-03-02	(NULL)
DBMF	2021-03-02	-0.004962186243509489	MJ	2021-03-02	-0.011930029915250804	VAMO	2021-03-02	-0.016623510051459445
DJP	2021-03-02	0.006244796003330647	MPC	2021-03-02	-0.001247777849447145	VCSH	2021-03-02	0
EMB	2021-03-02	-0.0006348916888660172	MSOS	2021-03-02	0.02247186879526136	VGSH	2021-03-02	0
EMR	2021-03-02	-0.009158796512449587	MSVX	2021-03-02	0.000276143356459276	VLO	2021-03-02	-0.01503851657018935
FLSP	2021-03-02	0.002431757737314459	MUB	2021-03-02	0.001646668789137517	VTIP	2021-03-02	0.0019433730628538376
FLT	2021-03-02	0.003327440707964576	NOW	2021-03-02	-0.012884761754736272	VTR	2021-03-02	0.004928875008683968
FMF	2021-03-02	-0.00639666376235572	POTX	2021-03-02	0.0034641803143547166	WAB	2021-03-02	-0.0013355820082501808
FTGC	2021-03-02	0.004245279199736041	QAI	2021-03-02	-0.0052631359993921345	WM	2021-03-02	0.01644748483135599
GIGB	2021-03-02	-0.0014780607670937084	RINF	2021-03-02	0	WMT	2021-03-02	-0.009591176153621598
GLD	2021-03-02	0.005447935401770063	SCHP	2021-03-02	0.003601341639848523	WTMF	2021-03-02	-0.0010174822264148475
GOOG	2021-03-02	-0.002723984030823812	SHV	2021-03-02	-0.00009041079597782897	YOLO	2021-03-02	0.000706336589237219
						ZTS	2021-03-02	-0.0040586286782582325

18M

ticker	date	returns_24m	Message			Summary		
			ticker	date	returns_24m	ticker	date	returns_24m
AAAU	2020-09-02	-0.013238289879749893	GOVT	2020-09-02	0.00214592211354316	QAI	ZU20-U9-U2	0.001275713574882275
AEP	2020-09-02	0.031996738740198361	GSG	2020-09-02	-0.020390070921985696	RINF	2020-09-02	-0.012557133574882275
AMP	2020-09-02	0.01635263487616919	HDG	2020-09-02	0.0023681377315793693	SCHP	2020-09-02	-0.000323101390733293
ANSS	2020-09-02	0.01948291810682546	HLT	2020-09-02	-0.004034382147449214	SHV	2020-09-02	0.0000904760704334452
APH	2020-09-02	0.019586534841128545	IAUM	2020-09-02	(NULL)	SHY	2020-09-02	0.0001571946742847204
AVB	2020-09-02	0.019595653418828975	IBM	2020-09-02	0.03873583148586842	SIVR	2020-09-02	-0.022451269782848747
BAR	2020-09-02	-0.013775510204081791	IEF	2020-09-02	0.001395652737158876	SLV	2020-09-02	-0.022570773625507783
BK	2020-09-02	0.012362372436984515	IGSB	2020-09-02	0.00018162496872670367	SNOW	2020-09-02	(NULL)
BND	2020-09-02	0.0021458818106492956	IUSB	2020-09-02	0.003667938697755486	THCX	2020-09-02	-0.011834283796370599
BSV	2020-09-02	0	JNJ	2020-09-02	0.015245545198737855	TIP	2020-09-02	0.0003934006136632055
BTAL	2020-09-02	-0.01091618689492153	KMLM	2020-09-02	(NULL)	TLT	2020-09-02	0.00952039325846749
C	2020-09-02	0.014648491807932512	KO	2020-09-02	0.042141802045236515	TTWO	2020-09-02	0.0019130550724638113
CLX	2020-09-02	0.016584174118395797	KRBN	2020-09-02	0.01082346648757638	UNG	2020-09-02	-0.0029629629629629
CNBS	2020-09-02	-0.0007338976854304878	LBAY	2020-09-02	(NULL)	UPAR	2020-09-02	(NULL)
COST	2020-09-02	0.021287426048914794	LOW	2020-09-02	0.01730403959121617	USO	2020-09-02	-0.024501795997981184
DBC	2020-09-02	-0.01327433628318582	MARB	2020-09-02	0.0002572031149822423	UVIX	2020-09-02	(NULL)
DBMF	2020-09-02	0.005306558616313648	MJ	2020-09-02	0.0016142215476299838	VAMO	2020-09-02	-0.0164272272901294
DJP	2020-09-02	-0.008823578431372412	MPC	2020-09-02	0.0011439098137476583	VCSH	2020-09-02	0.0004816298296478384
EMB	2020-09-02	0.004122317735033439	MSOS	2020-09-02	(NULL)	VGSH	2020-09-02	-0.00032201444245617296
EMR	2020-09-02	0.00812779019981001	MSVX	2020-09-02	0.008713823619666224	VLO	2020-09-02	0.0083857094116334
FLSP	2020-09-02	0.00593410527519881	MUB	2020-09-02	-0.00008629722105475355	VTIP	2020-09-02	-0.0005874014146291058
FLT	2020-09-02	0.014640541328842311	NOW	2020-09-02	0.005028258794310993	VTR	2020-09-02	0.04943851521036306
FMF	2020-09-02	-0.0035484961638817232	POTX	2020-09-02	0.002136750063999845	WAB	2020-09-02	0.00507898776274356
FTGC	2020-09-02	-0.0043166149914326	QAI	2020-09-02	0.001277524398958177	WM	2020-09-02	0.00448790420088283
GIGB	2020-09-02	0.004671144387363794	RINF	2020-09-02	-0.012557133574882275	WMT	2020-09-02	0.000696149711438432
GLD	2020-09-02	-0.01313162907649353	SCHP	2020-09-02	-0.000323101390733293	WTMF	2020-09-02	-0.00339941046058291
GOOG	2020-09-02	0.040687428870784186	SHV	2020-09-02	0.0000904760704334452	YOLO	2020-09-02	-0.015335072220228164
						ZTS	2020-09-02	0.0202406554797445

24M

### Description:

12-month return: in the short-term these security's momentum and performance shows them as the top 3 securities in the portfolio: POTX, USO, and WAB. All having a return above 0.02. This would indicate that in the short-term these securities perform well and have a solid return rate. I would recommend the client short-sells these securities and makes a high profit off of them.

18-month return: Now we can begin to gage the security's performance over a medium-term. The top 3 performing securities in the 18-month period were KRN, MSOS, and UNG. KRN having a return of 0.0138 meanwhile MSOS and UNG were about 0.02. I would suggest the client keeps these securities since they show promise for long-term successful performance.

24-month return: in the long term the highest performing securities are ANSS, APH, and GOOG with a performance above 0.19 for all. GOOG scoring incredibly high with a 0.04. I would suggest the client maintains these securities in their portfolio in the long-term. Specially GOOG since it has proven its performance is much higher in the long term than in the short term.

## Code Entire Portfolio

```

461 -- view 12m returns for the entire portfolio
462 SELECT Avg(percentage_weight) AS
463 portfolio_return_12m
464 FROM (
465   SELECT j.date, sum(j.discrete_ror*j.weight) AS
466   portfolio_weight_daily
467   FROM (
468     SELECT ticker, date, discrete_ror, weight
469     FROM FS_returnsV
470     LEFT JOIN FS_Aguilar_P_Weights
471       USING (ticker)
472   ) j
473 WHERE j.date > '2021-09-01'
474 GROUP BY j.date
475 ) p;
476 -- recent 18M returns for the entire portfolio
477 SELECT Avg(percentage_weight) AS
478 portfolio_return_18m
479 FROM (
480   SELECT j.date, sum(j.discrete_ror*j.weight) AS
481   portfolio_weight_daily
482   FROM (
483     SELECT ticker, date, discrete_ror, weight
484     FROM FS_returnsV
485     LEFT JOIN FS_Aguilar_P_Weights
486       USING (ticker)
487   ) j
488 WHERE j.date > '2021-03-01'
489 GROUP BY j.date
490 ) p;
491 -- recent 24M returns for the entire portfolio
492 SELECT Avg(percentage_weight) AS
493 portfolio_return_24m
494 FROM (
495   SELECT j.date, sum(j.discrete_ror*j.weight) AS
496   portfolio_weight_daily
497   FROM (
498     SELECT ticker, date, discrete_ror, weight
499     FROM FS_returnsV
500     LEFT JOIN FS_Aguilar_P_Weights
501       USING (ticker)
502   ) j
503 WHERE j.date > '2020-09-01'
504 GROUP BY j.date
505 ) p;

```

## Results

<b>portfolio_return_12m</b>
-0.00003944407657460495
<b>portfolio_return_18m</b>
0.00031664026709132484
<b>portfolio_return_24m</b>
0.00039701955940348954

## Description:

12-month return: in the short-term the portfolio did not perform well with a negative return of -0.0000394. This means that most of its securities are a long-term bet instead of short-term which is a good mentality to have when investing. I would suggest, overall the client should not consider making many changes to the portfolio nor consider selling his securities in the short-term since that would result in a loss instead of a gain.

18-month return: In the medium-term the portfolio is out of the negative and into a positive performance with a high return of 0.0003166. This proves that the longer the client maintains this portfolio the more promise it shows when coming to returns. Though we cannot 100% rely on returns to say how the portfolio will perform in the future, this number proves that the best

course of action for the client is to keep the portfolio in the long-term and not make too many changes to it.

24-month return: in the long term the portfolio performed at its highest with a total return of 0.000397. Once again, this proves that the client's best interest lies in maintaining the portfolio for as long as possible.

## 2. What is the most recent 12months sigma (risk) for each of the securities? What is the average daily return for each of the securities?

Code

```

400 -- Creating returns and risk table
401 CREATE ALGORITHM=UNDEFINED DEFINER='user3'@'%'
402 SQL SECURITY DEFINER VIEW `invest`.`FS_returns` AS
403 select `a`.`ticker` AS `ticker`, `a`.`date` AS
404 `date`, avg(`a`.`returns_d`) AS `AVG(a.returns_d)`, std(`a`.`returns_d`) AS
405 `STD(a.returns_d)`, (avg(`a`.`returns_d`) / std(`a`.`returns_d`)) AS
406 `risk_adj_returns` from (select `z`.`date` AS `date`, `z`.`ticker` AS
407 `ticker`, `z`.`price_type` AS `price_type`, `z`.`p1` AS `p1`, `z`.`p0` AS
408 `p0`, ((`z`.`p1` - `z`.`p0`) / `z`.`p0`) AS `returns_d`
409 from (select `invest`.`FS_Aguilar_recommended_tickerlist`.`date` AS
410 `date`, `invest`.`FS_Aguilar_recommended_tickerlist`.`ticker` AS
411 `ticker`, `invest`.`FS_Aguilar_recommended_tickerlist`.`price_type` AS
412 `price_type`, `invest`.`FS_Aguilar_recommended_tickerlist`.`value` AS
413 `p1`, lag(`invest`.`FS_Aguilar_recommended_tickerlist`.`value`,21) OVER (PARTITION BY `invest`.`FS_Aguilar_recommended_tickerlist`.`ticker`
414 ORDER BY `invest`.`FS_Aguilar_recommended_tickerlist`.`date` ) AS
415 `p0`
416 from `invest`.`FS_Aguilar_recommended_tickerlist`
417 where ((`invest`.`FS_Aguilar_recommended_tickerlist`.`price_type` = 'Adjusted') and (`invest`.`FS_Aguilar_recommended_tickerlist`.`date` >= '2021-09-09'))) `z` ) `a`
418 group by `a`.`ticker`
419 ;
420 
```

Results

ticker	date	AVG(a.returns_d)	STD(a.returns_d)	risk_adj_returns
AAAU	2021-09-09	-0.0007091026517556708	0.037590751463450055	-0.018863753028325065
ANSS	2021-09-09	-0.02256494709732472	0.09639759650198798	-0.23408205096544465
BND	2021-09-09	-0.005445268568668422	0.012249776596272166	-0.4445198266167171
DBC	2021-09-09	0.008200829388874476	0.043225400478942286	0.1897224617472219
EMB	2021-09-09	-0.009668917680768975	0.02592562375355322	-0.3729483144814908
FLT	2021-09-09	-0.005871870550896534	0.06386253636181752	-0.09237942484661152
FMF	2021-09-09	0.004330706119388977	0.025189968931842922	0.17192185234950738
GIGB	2021-09-09	-0.007164571866661125	0.016485787076625732	-0.4345908286550278
GOVT	2021-09-09	-0.009543654899134902	0.0150648694136163	-0.6335039911138507
IBM	2021-09-09	0.006598022416419217	0.06285679722849048	0.10496911563016444
IUSB	2021-09-09	-0.0054884790865648075	0.011988792582354505	-0.4578008209636498
KRBN	2021-09-09	0.006402610105922474	0.0803829676732268	0.07965132777817303
LBAY	2021-09-09	0.009134795861641775	0.028842803986735697	0.3167097022135125
MPC	2021-09-09	0.054513173069236774	0.10122352487557863	0.5385425288858787
MSVX	2021-09-09	-0.00351304914114107	0.019740163060491575	-0.17796454519528104
MUB	2021-09-09	-0.0066217712615427	0.01496668202859384	-0.44243415132972086
SHV	2021-09-09	-0.000009593941818354047	0.000520145968931002	-0.0184447105070744
TLT	2021-09-09	-0.00811522171420636	0.02464299128129026	-0.3291614268264243
TTWO	2021-09-09	-0.00591571551330396	0.07806932233978656	-0.0757751615619643
USO	2021-09-09	0.03807699009307823	0.10487214021609208	0.36308012799795536
UVIX	2021-09-09	-0.08725467400516272	0.2599273289298959	-0.3356887264005082
VAMO	2021-09-09	0.00639208763380617	0.039656670829993315	0.16118568452729717
VLO	2021-09-09	0.06124857225937767	0.12470184152604945	0.49116012650529484

## Description:

When it comes to the average daily return, the top 3 most volatile and risky securities in the portfolio are VLO, MPC, and USO in that respective order. Meaning that these are the 3 highest daily returns calculated out of the portfolio and have fluctuating prices. Having a healthy amount of risk is something I would recommend the client. From the calculations, there wasn't one security that highly deviated from the mean of average daily return, therefore my recommendation would be to not change the level of risk the portfolio maintains since it is not a highly risky portfolio and if we reduce risk we are also reducing the potential reward.

The 12 month sigma calculations do not tell the exact same story. The volatility of the portfolio is higher when utilizing this metric than when utilizing the average. The top three most volatile securities are MPC, VLO, and USO in that respective order. All having a sigma higher than 0.3. I would recommend, because of the previous results in the 12M, 18M, and 24 M returns calculations to keep the securities though because in the long-term they have previously proven to perform well and add a lot of value to the portfolio, meaning they are worth the risk.

### 3. Suggest adding a new investment to your portfolio - what would it be and how much risk (sigma) would it add to your client?

## Code

```
554 -- Creating table with Calculations for new Portfolio
555 CREATE ALGORITHM=UNDEFINED DEFINER='user3@%'
556 SQL SECURITY DEFINER VIEW `FS_New_Investments_P` AS
557 select `a`.`ticker` AS `ticker`, `a`.`date` AS
558 `date`, avg(`a`.`returns_d`) AS AVG(`a`.`returns_d`), std(`a`.`returns_d`) AS
559 `STD(`a`.`returns_d`), (avg(`a`.`returns_d`) / std(`a`.`returns_d`)) AS
560 `risk_adj_returns` from (select `z`.`ticker` AS `ticker`, `z`.`date` AS
561 `date`, ((`z`.`p1` - `z`.`p0`) / `z`.`p0`) AS `returns_d` from (select `p`.`ticker` AS
562 `ticker`, `p`.`date` AS `date`, `p`.`value` AS `p1`, lag(`p`.`value`,2) OVER (PARTITION BY `p`.`ticker` ORDER BY `p`.`date`) AS
563 `p0`
564 from (((pricing_daily_new` `p`
565 join `security_masterlist` `s`
566 on(`p`.`ticker` = `s`.`ticker`))
567 join `holdings_current` `h`
568 on(`s`.`ticker` = `h`.`ticker`))
569 join `account_dim` `a`
570 on(`h`.`account_id` = `a`.`account_id`))
571 join `customer_details` `c`
572 on(`a`.`client_id` = `c`.`customer_id`))
573 where ((`p`.`price_type` = 'Adjusted') and (`p`.`ticker` in ('SHV',
574 'VAMO',
575 'EMB',
576 'ENHP',
577 'SCO',
578 'FTLS',
579 'BIL',
580 'IAU',
581 'DBC',
582 'PPLT',
583 'CTA')) and (`p`.`date` >= '2021-09-09'))) `z` ) `a` group by `a`.`ticker`
```

## Results

ticker	date	AVG(a.returns_d)	STD(a.returns_d)	risk_adj_returns
BIL	2021-09-09	0.000007484833615003052	0.0008221169579879856	0.0910434159310023
CTA	2021-09-09	0.0006183165428132779	0.006982580154090974	0.08855129897091361
DBC	2021-09-09	0.0005625618471748535	0.010875138249691118	0.05172916741456889
EMB	2021-09-09	-0.00038495936933902246	0.005206517660560505	-0.07393797436914483
FTLS	2021-09-09	0.000020326611484726665	0.005267264445290289	0.0038590451829130495
IAU	2021-09-09	-0.00012327909967172615	0.007770840707508013	-0.015864319487673532
PPLT	2021-09-09	-0.0001303507925652208	0.012238158802277894	-0.010651176755522943
SCO	2021-09-09	-0.0023176696691071014	0.03766780927434956	-0.06152918669165483
SHV	2021-09-09	-0.00000004152133555671274	0.00012051769508199097	-0.003445248063237918
VAMO	2021-09-09	0.0002475003028913846	0.010054420972697055	0.024616067256729726

Description: I would suggest adding the aforementioned securities to the portfolio to try to bring down the total sigma risk calculation of the portfolio down. They would serve to neutralize risk as a whole for the portfolio. Both the average daily returns and sigma returns are lower than the riskiest securities in the portfolio, therefore these securities would benefit the client by making his portfolio even more conservative and stable.

4. Calculate risk adjusted returns for each of your securities by following this formula: AVG(returns for ticker)/STD(returns for ticker). Which of the securities is best from the rest (with highest risk adjusted returns), why?

## Code

```

530 CREATE ALGORITHM=UNDEFINED DEFINER=user3 @%
531 SQL SECURITY DEFINER VIEW `invest`.`FS_Final_step` AS
532 select `a`.`ticker` AS `ticker`, `a`.`date` AS
533 `date`,avg(`a`.`returns_d`) AS `AVG(a.returns_d)`,std(`a`.`returns_d`) AS
534 `STD(a.returns_d)`,avg(`a`.`returns_d` / std(`a`.`returns_d`)) AS
535 `risk_adj_returns` from (select `z`.`ticker` AS `ticker`,`z`.`date` AS `date`,((`z`.`p1` - `z`.`p0`) / `z`.`p0`) AS
536 `returns_d` from (select `p`.`ticker` AS
537 `ticker`,`p`.`date` AS `date`,`p`.`value` AS `p1`,lag(`p`.`value`,21) OVER (PARTITION BY `p`.`ticker` ORDER BY `p`.`date` ) AS
538 `p0`
539   from (((`invest`.`pricing_daily_new` `p`
540   join `invest`.`security_masterlist` `s`
541   on(`p`.`ticker` = `s`.`ticker`))
542   join `invest`.`holdings_current` `h`
543   on(`s`.`ticker` = `h`.`ticker`))
544   join `invest`.`account_dim` `a`
545   on(`h`.`account_id` = `a`.`account_id`)
546   join `invest`.`customer_details` `c`
547   on(`a`.`client_id` = `c`.`customer_id`)
548   where ((`p`.`price_type` = "Adjusted") and (`p`.`ticker` in (
549     'MPC',
550     'UVIX',
551     'IBX',
552     'GIGB',
553     'TWO',
554     'TLT',
555     'TUSB',
556     'ANSS',
557     'HSVX',
558     'PMF',
559     'IND',
560     'FLT',
561     'USO',
562     'KBN',
563     'VLO',
564     'DBC',
565     'GOVT',
566     'LBAY',
567     'MOB',
568     'AAAU',
569     'SHV',
570     'VAMO')) and (`p`.`date` > '2019-09-01'))) `z` ) `a` group by `a`.`ticker`
```

## Results

ticker	date	AVG(a.returns_d)	STD(a.returns_d)	risk_adj_returns
AAAU	2019-09-03	0.00010822171148601193	0.007735992429428372	0.0139893766020669
ANSS	2019-09-03	0.0029543875443102637	0.05437658074681114	0.054331984536992436
BND	2019-09-03	-0.00004431936558579383	0.0031465730470961783	-0.014084963203601471
DBC	2019-09-03	0.000371421374462803	0.009274432848269726	0.04004788007410036
FLT	2019-09-03	-0.0007104115348565227	0.04756112826637039	-0.014936809969641567
FMF	2019-09-03	0.0001383925891048427	0.00616354658955236	0.022453401964938134
GIGB	2019-09-03	-0.00004180636097602084	0.004812504590071554	-0.008687027761442458
GOVT	2019-09-03	-0.000051640866805012065	0.0026890408840153568	-0.01920419548545516
IBM	2019-09-03	0.0013257717417600417	0.03656458082055769	0.03625836019470114
IUSB	2019-09-03	-0.000049613208716165405	0.002958130575619941	-0.016771811604620556
KRBN	2019-09-03	0.00062050779997874	0.014890945157301919	0.04167014205102139
LBAY	2019-09-03	0.0003716094343754449	0.006045902607008364	0.061464674264629746
MPC	2019-09-03	0.005759321294536784	0.06415439948349808	0.08977281902573507
MSVX	2019-09-03	0.00000438009550800992	0.005465547908339389	0.000801400990617377
MUB	2019-09-03	-0.000014556585853572293	0.003322155354918669	-0.004381669217250877
SHV	2019-09-03	0.0000093890973397799	0.00011105730008395567	0.08454282008190413
TLT	2019-09-03	-0.00015029583243268132	0.008459738910971331	-0.017766013113922997
TTWO	2019-09-03	0.000865962576636218	0.05448268076715612	0.0158942725365718
USO	2019-09-03	0.00013300548807725293	0.0244723680921482	0.005434925119483099
UVIX	2019-09-03	-0.00033554220245093057	0.06634324182962788	-0.005057669676628351
VAMO	2019-09-03	0.0002369372306360725	0.010706204279100066	0.022130834090155132
VLO	2019-09-03	0.0295501223448685	0.17092277041384205	0.17288581429683758

Description: According to the calculations above, the security with the highest risk adjusted return is VLO since has the highest result of the aforementioned calculation which yields a result of 0.1728 which is higher than the second highest security by much. This is the best security in the portfolio because having the highest risk adjusted return means that this security generated the highest return for the amount of risk that the client took on. The purpose of buying securities is to maximize the client's return and minimize their risk, and this security takes on an appropriate amount of risk that earns a higher return and adds diversification to the portfolio.