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RJESTATS: A System of Programs for Remote Job Entry Station Accounting

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ENVIRONMENTAL SCIENCES DIVISION
Publication No. 1152

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ABSTRACT

STRAND, R. H., G. B. RAINE, M. L. THARP, and N. A. GRIFFITH. 1978. RJESTATS: A system of programs for remote job entry station accounting. ORNL/TM-6294. Oak Ridge National Laboratory, Oak Ridge, Tennessee. 24 pp.

The RJESTATS system of programs provides accounting information on the use of the Environmental Sciences Division Remote Job Entry (RJE) facility. Summaries can be generated to display the number and kind of users, types of jobs run through the RJE facility, and the persons (or projects) that are utilizing the facility. Sample tables are presented to show certain summaries by user name, job name initials, and types of jobs run. RJESTATS is useful for managing and determining the use of an IBM-compatible RJE facility.

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INTRODUCTION

In 1972, the Environmental Sciences Division at Oak Ridge National Laboratory installed a remote job entry (RJE) station for submitting to and retrieving jobs from the main computers operated by the Computer Sciences Division. At that time, efforts were made to manually account for the job traffic through the RJE facility. Records were kept of jobs submitted, by whom, when they were submitted and when they were retrieved. Approximate counts of the numbers of cards read and lines printed also were recorded.

As the volume of jobs increased from approximately 20 to over 90 per day, a system for automating these procedures was devised. Consultation with the Computer Sciences Division outlined the statistics they record for jobs processed through the main computers. Master files were created for every job processed through the system. With the cooperation of the Computer Sciences Division, programs for subsetting the master files, creating a disk file containing our RJE station records, and summarizing the data for analysis were developed. This report briefly describes these programs.

The capability presented here is particularly useful to RJE facilities already in operation or to those being developed, as job statistics, flow, and accounting procedures become a part of the RJE facility justification, and constitute a major aid to program planning.

System Modules

The RJESTATS system consists mainly of a Cobol program, an IBM utility program, and a program written in the Statistical Analysis

System (SAS) language. An additional SAS program has been added to calculate statistics of turnaround times by job class.

The Cobol program was written to search the master accounting tapes created by the Houston Automatic Spooling Program (HASP) on the ORNL main computers. A record is created by HASP on the accounting files for each job passing through the main computers. The information (Table 1) recorded includes the RJE facility number, the print and punch destination codes, computer request number, date, job name initials, and time in/time out figures. Other information recorded on the CSD master files was not pertinent to our purposes. Selecting only those records which carried our RJE facility number, a subset file was created. This file was sorted by job name initials and the sorted file placed on magnetic tape.

An IBM utility, IEBGENER, was then programmed to copy the tape file to a semi-permanent disk file. The disk file was used as input to a SAS program written to analyze and summarize the job accounting information. Initially, summary tables and summary files were generated on a monthly basis. Currently, the summary tables are generated on a quarterly basis from the monthly summary files.

Tables 2-4 show three of the current summary tables used in a quarterly RJE facility accounting. Summary by HASP job class allows the RJE facility manager to determine the volume and kind of jobs that users input through the RJE station. User name and job initial summaries provide a rapid means of determining the users of the RJE facility and the frequency of utilization. The user names are merged with the master

Table 1. A subset of HASP accounting information for RJE jobs submitted through the central IBM 360 computers at Oak Ridge National Laboratory

Accounting variable
• RJE facility number • Print destination code • Punch destination code • Job number • Request number • Date (MMDDYY) • Job name • Job class • Job execution time • Number of print lines • Number of cards read • Job input time • Job print time

Table 2. Distribution of RJE use by job class for 1st Quarter 1978

HSPCLASS	DEFINITION	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
A	360/91 30 SECONDS 256 K CORE	1005	1005	20.481	20.481
B	360/91 5 MINUTES 256 K CORE	287	1292	5.849	26.33
C	360/91 5 MINUTES 512 K CORE	379	1671	7.724	34.053
D	UNLIMITED TIME & CORE W/O TAPE, OR SPEC DISK	23	1694	0.469	34.522
E	360/91 MAG TAPE 5 MINUTES 512 K CORE	77	1771	1.569	36.091
F	UNLIMITED TIME & CORE WITH TAPES	27	1798	0.55	36.642
G	360/91 MAG TAPE 30 SECONDS 256 K CORE	197	1995	4.015	40.656
H	K-25 JOBS	23	2018	0.469	41.125
O	360/91 10 SECONDS 256 K CORE	2889	4907	58.875	100

Table 3. Distribution of RJE use by user for 1st Quarter 1978

USERINIT	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
ABS	1	1	0.020	0.020
BAS	75	76	1.528	1.549
BLA	156	232	3.179	4.728
BLK	96	328	1.956	6.684
BMR	178	506	3.627	10.312
BPS	28	534	0.571	10.882
BRP	14	548	0.285	11.168
BSA	44	592	0.897	12.064
CCC	37	629	0.754	12.818
COO	2	631	0.041	12.859
CPL	97	728	1.977	14.836
CSF	12	740	0.245	15.080
CWF	27	767	0.550	15.631
CWM	26	793	0.530	16.161
DAR	75	868	1.528	17.689
DCK	227	1095	4.626	22.315
DDH	54	1149	1.100	23.416
DDJ	201	1350	4.096	27.512
DLD	452	1802	9.211	36.723
DSV	92	1894	1.875	38.598
EEH	8	1902	0.163	38.761
ELE	52	1954	1.060	39.821
FOD	134	2088	2.731	42.551
GAR	91	2179	1.854	44.406
GGK	38	2217	0.774	45.180
HHS	71	2288	1.447	46.627
JAW	63	2351	1.284	47.911
JDN	25	2376	0.509	48.421
JJB	11	2387	0.224	48.645
JOG	83	2470	1.691	50.336
JSM	10	2480	0.204	50.540
JTK	33	2513	0.673	51.213
JWR	2	2515	0.041	51.253
KDK	550	3065	11.208	62.462
KTJ	41	3106	0.836	63.297
LKM	49	3155	0.999	64.296
LLD	3	3158	0.061	64.357
LTS	339	3497	6.908	71.266
LWB	76	3573	1.549	72.814
MLF	8	3581	0.163	72.977
NAG	24	3605	0.489	73.466
NTE	11	3616	0.224	73.691
OAK	6	3622	0.122	73.813
PAR	30	3652	0.611	74.424
RAS	118	3770	2.405	76.829
RIV	32	3802	0.652	77.481
RJL	1	3803	0.020	77.502
RJX	343	4146	6.990	84.492
RKM	59	4205	1.202	85.694
RKS	36	4241	0.734	86.428
ROB	247	4488	5.034	91.461
RRT	81	4569	1.651	93.112
RSW	14	4583	0.285	93.397
RVH	6	4589	0.122	93.519
SOL	2	4591	0.041	93.560
SPK	48	4639	0.978	94.538
SWC	28	4667	0.571	95.109
VJR	102	4769	2.079	97.188
WAD	6	4775	0.122	97.310
WAH	8	4783	0.163	97.473
WRE	48	4831	0.978	98.451
WVW	21	4852	0.428	98.879
XYZ	7	4859	0.143	99.022
YHC	48	4907	0.978	100.000

Table 4. Distribution of RJE use by user job name initials for 1st Quarter 1978

USERNAME	FREQUENCY	CUM FREQ	PERCENT	CUM PERCENT
BARNTHOUSE, L.W.	76	76	1.549	1.549
BEAUCHAMP, J.J.	11	87	0.224	1.773
BLASING, T.J.	156	243	3.179	4.952
CHAN Y.H.	48	291	0.978	5.930
CHRISTENSEN, S.W	28	319	0.571	6.501
COONEY, J.D.	2	321	0.041	6.542
COUTANT, C.C.	37	358	0.754	7.296
DEANGELIS, D.L.	452	810	9.211	16.507
DUNNING, D.E.	201	1011	4.096	20.603
DYE, L.L.	3	1014	0.061	20.664
EDWARDS, N.T.	11	1025	0.224	20.889
EMANUEL, W.R.	48	1073	0.978	21.867
ETNIER, E.L.	52	1125	1.060	22.926
EX EMPLOYEE	36	1161	0.734	23.660
FRANCES, C.W.	27	1188	0.550	24.210
FRANK, M.L.	8	1196	0.163	24.373
GARDNER, R.H.	91	1287	1.854	26.228
GRIFFITH, N.A.	24	1311	0.489	26.717
HOFFMAN, W.A.	8	1319	0.163	26.880
HUBER, E.E.	8	1327	0.163	27.043
HUFF, D.D.	54	1381	1.100	28.143
JONES, J.R.	83	1464	1.691	29.835
KILLOUGH, G.G.	38	1502	0.774	30.609
KIRK, B.L.	96	1598	1.956	32.566
KITCHINGS, J.T.	74	1672	1.508	34.074
KLOSIEWSKI, S.P.	48	1720	0.978	35.052
KOCHER, D.C.	227	1947	4.626	39.678
KUMAR, K.D.	550	2497	11.208	50.886
LITTLE, C.P.	97	2594	1.977	52.863
LUXMOORE, R.J.	1	2595	0.020	52.884
MANN, L.K.	49	2644	0.999	53.882
MATTICE, J.S.	10	2654	0.204	54.086
MCCONATHY, R.K.	59	2713	1.202	55.288
MILLER, C.W.	32	2745	0.652	55.940
MOORE, R.E.	247	2992	5.034	60.974
NEWBOLD, J.D.	25	3017	0.509	61.484
ODONNELL, F.O.	134	3151	2.731	64.214
OLSON, R.J.	343	3494	6.990	71.204
ONEILL, E.	44	3538	0.897	72.101
OTHER	28	3566	0.571	72.672
PARKHURST, B.R.	14	3580	0.285	72.957
PARR, P.D.	30	3610	0.611	73.568
RANNEY, J.W.	104	3714	2.119	75.688
ROSS, B.M.	178	3892	3.627	79.315
SHUGART, H.H.	71	3963	1.447	80.762
SIMMONS, B.A.	75	4038	1.528	82.291
SPALDING, B.P.	28	4066	0.571	82.861
STRAND, R.H.	118	4184	2.405	85.266
THARP, M.L.	339	4523	6.908	92.174
TURNER, R.R.	81	4604	1.651	93.825
VAN HOOK, R.I.	38	4642	0.774	94.600
VAN WINKLE, W.	21	4663	0.428	95.028
VAUGHAN, D.S.	92	4755	1.875	96.902
WARD, D.S.	6	4761	0.122	97.025
WATTS, J.A.	64	4825	1.304	98.329
WEINSTEIN, D.A.	7	4832	0.143	98.472
WEST, D.C.	75	4907	1.528	100.000

files using the SAS program and a cross reference file containing the user initials and user names.

An additional program written in the SAS language was implemented to calculate and plot turnaround time (time between submission and retrieval), for each job class, depending on the time of day the job was submitted along with a frequency tabulation. Table 5 shows one way of summarizing these statistics. One use of these data is to determine potentially "better" times of the day for submitting jobs. For class A and B jobs the turnaround time increases as the morning progresses up to the noon hour when the turnaround time decreases. This indicates that, based on the average turnaround time for these jobs, jobs submitted during the noon hour have a better chance of coming back before the day ends than those A and B jobs submitted before noon or after 1:00 PM. Similar comparison can be made for the other job classes. However, for the longer-running, larger jobs, e.g., C and D classes, the job will probably not be executed until after the user has gone for the day. The turnaround time then can be used to estimate when to return to obtain job output.

The statistics and summary tables presented can be used by other RJE stations in the ORNL computer complex, when the appropriate HASP information is analyzed. With this system of software, each RJE station can summarize the flow of computer jobs and account for the use of the facility. The usefulness of this software system at RJE facilities outside of the ORNL complex is dependent upon the HASP accounting information kept at that installation. Certainly, if the format of the accounting information differs, the program input formats are the only

Table 5. Turnaround time (in minutes) for various classes of jobs depending upon time of day submitted along with job frequency (in parentheses). Job classes are defined in Table 2.

Input time of day	Job class									
	A	B	C	D	E	F	G	H	M	O
0700-0800	92.18(33)	33.00(2)	188.50(14)		180.00(1)	1169.00(2)				86.90(39)
0800-0900	70.49(98)	352.40(20)	542.97(29)	1712.93(14)	272.14(22)	1886.38(13)	461.55(22)	4.00(1)	1.00(1)	63.42(192)
0900-1000	184.99(154)	463.31(42)	1375.34(29)	1660.49(43)	360.92(12)	1922.78(9)	478.00(23)	23.00(1)	1.00(1)	25.04(205)
1000-1100	296.00(106)	965.24(25)	1343.00(21)	1870.00(10)	366.67(30)	1869.25(4)	491.77(13)	19.00(1)	2394.00(1)	37.36(234)
1100-1200	409.65(77)	1197.09(11)	1568.00(15)	812.43(14)	520.75(2)		369.17(24)	23.50(2)		58.46(186)
1200-1300	263.59(61)	863.03(30)	1040.27(11)	1522.64(16)	756.06(16)	1263.00(5)	594.21(19)		9.00(1)	96.10(204)
1300-1400	483.93(98)	1144.47(32)	1325.46(13)	1512.25(64)	1230.50(12)	1481.14(7)	885.54(24)		2399.00(1)	80.94(252)
1400-1500	794.48(102)	963.15(20)	1287.57(14)	1478.36(28)	952.11(9)	1679.20(5)	948.59(17)	3.00(1)		74.94(266)
1500-1600	879.70(97)	1408.64(25)	1117.17(18)	1319.59(27)	1265.00(18)	1195.40(5)	1217.48(25)	242.20(5)		64.42(226)
1600-1700	843.68(44)	1198.17(23)	1208.00(4)	1416.17(6)	1197.06(16)	1301.67(3)	1205.50(10)			135.05(134)

modifications required. The Job Control Language (JCL), software compilers (COBOL and SAS), and the IBM Utility (IEBGENER) are required for the system to be transported to other facilities. If these specific programs or software versions are not available at the desired facility, at least the job accounting methodology can be applied but implemented with appropriate software.

Summary

The RJESTATS system of programs provides accounting information on the use of the Environmental Sciences Division RJE facility. Summaries can be generated to display the number and kind of users, types of jobs input through the RJE facility, and the persons (or projects) that are utilizing the facility. From the summary tables, cost distributions to cost collect centers or projects can be made. The RJESTATS system continues to be a valuable accounting and managerial tool in the Environmental Sciences Division.

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