R_admin – RACF's Administration API

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Disclaimer

Trademarks

Agenda

- API overview
- Description of each of the functions
- Documentation “demo”

Overview

- The R_admin callable service (IRRSEQ00) is an assembler programming interface which allows for management of RACF profiles and system wide settings (SETROPTS)
- Easier to use than RACROUTE or ICHEINTY
- Documentation completely rewritten for z/OS V1R7

R_admin functions

- Run a RACF command
  - By providing a command image
  - By providing tokenized data
- Extract user or group profile information
- Extract SETROPTS settings
- Retrieve a PKCS#7 password envelope

R_admin as a SAF Interface

- R_admin called by SAF router, subject to SAF exits
- But it is a highly RACF-specific interface
  - Segment names, field names, data format
- Don’t expect this to be a general administrative interface which will work regardless of the underlying security product

R_admin and LDAP

- Consider using LDAP and the SDBM backend in order to retrieve and update RACF data
  - Open, remote-able interface, callable by java, C, and REXX
  - Restricted to users, groups and connections

Call parameters

```
CALL IRRSEQ00,(Work_area,              /* Common parms   */
               ALET,SAF_return_code,  /*  for all the   */
               ALET,RACF_return_code,/*  RACF callable */
               ALET,RACF_reason_code,/*  services      */
               Function_code,         /* Requested fcn  */
               Parm_list,             /* Input p-list   */
               RACF_userID,           /* "Run-as" user  */
               ACEE_ptr,              /* "Run-as" ACEE  */
               Out_message_subpool,   /* Output subpool */
               Out_message_strings    /* Output anchor  */
              ),VL
```

R_admin General Attributes

- Caller specifies the function to perform and provides a function-specific parameter list
- Caller provides a subpool and address field for the output
- Supervisor state callers can specify an identity under whose authority the request will run
- Some functions are available to problem state callers, and are protected by FACILITY resources
- Most functions require the RACF subsystem address space. Caller does not require a TSO environment.

Note: IRRPCOMP macro provides some mappings and constants

Run command

Run-command

- Caller provides RACF command image as function-specific parameter list
- R_admin sends command to RACF address space for execution
- Command output is returned to caller
- Amount of output is restricted to 4096 **lines** (not bytes) of output

Function code	Authorization	RACF address space required
5	▪Command processor authorization ▪FACILITY - IRR.RADMIN.<cmd-name> (READ)	Yes

Run command – input format

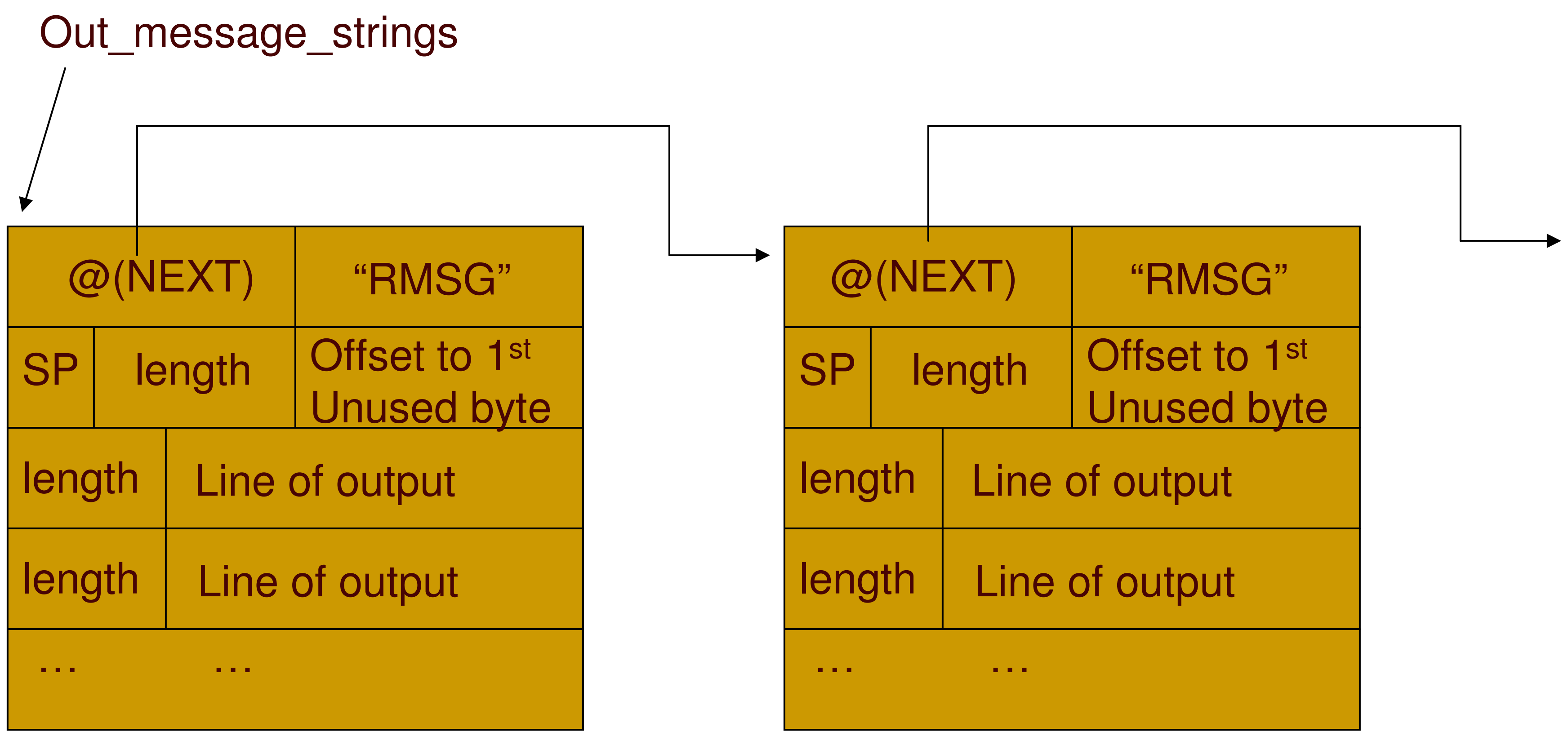
Parm_list

Length (2 bytes)	Left-justified RACF command image …

For example

41	ALTUSER GEORGE REVOKE NOSPECIAL NAME(MUD)

Run command – output format

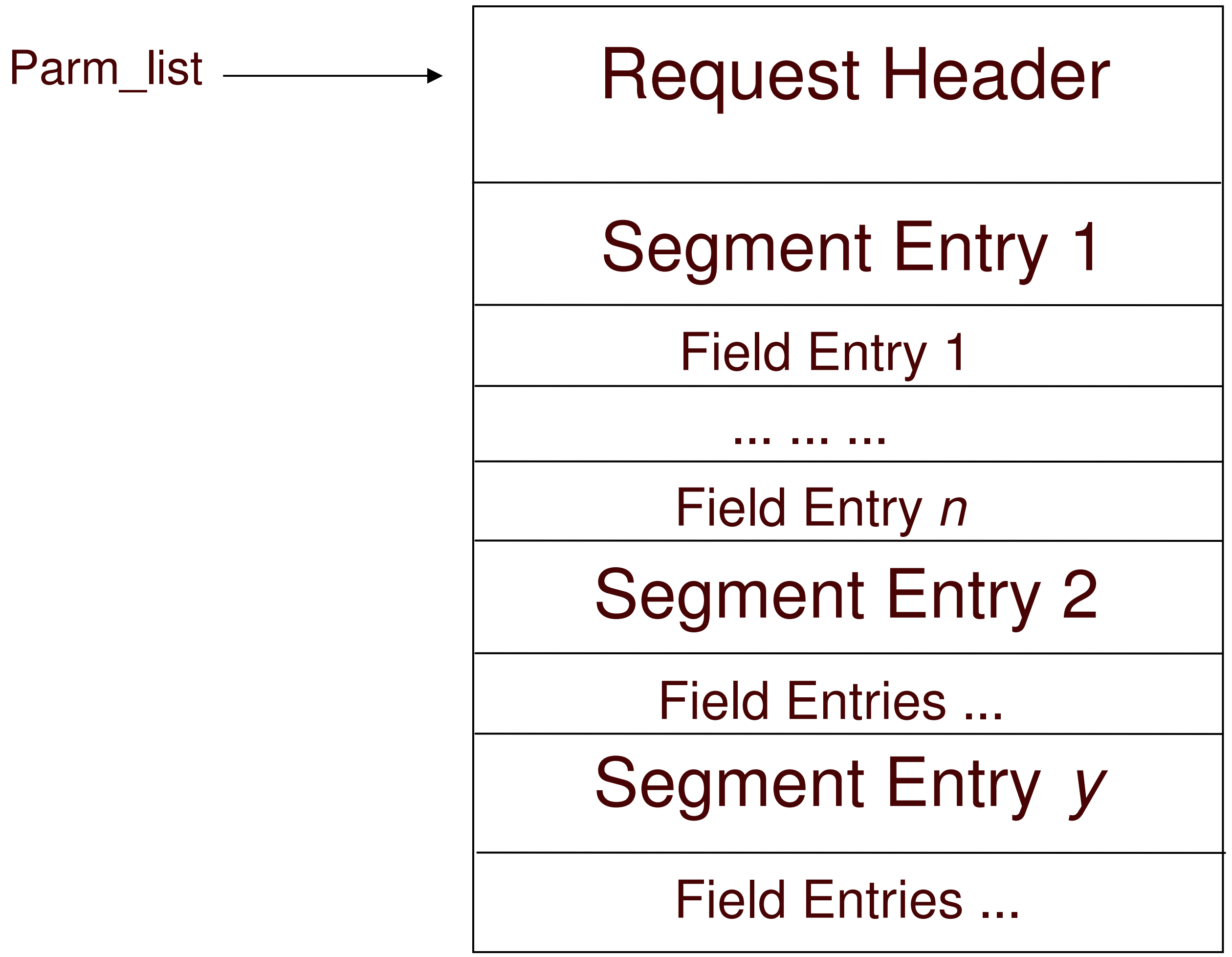


Run command - tokenized

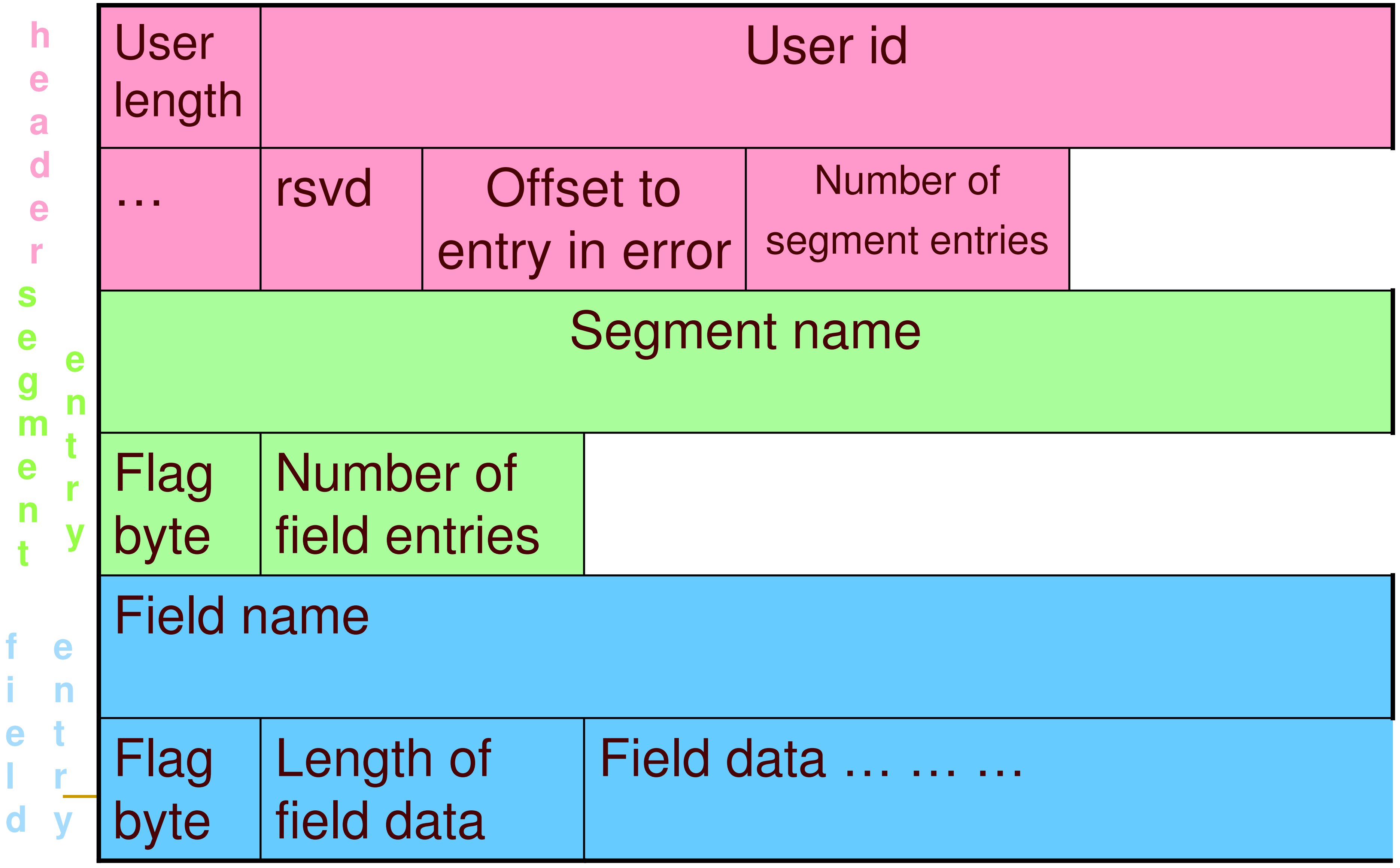
- Caller provides architected input structure
- Add, alter, delete, and list commands supported for each of the profile types
  - Including CONNECT, REMOVE, PERMIT
- SETROPTS also supported
- R_admin creates the command image internally from input parameter list
- Command output returned same as for run-cmd

Function codes	Authorization	RACF address space required
1-4, 6-21	▪Supervisor state ▪Command processor authorization	Yes

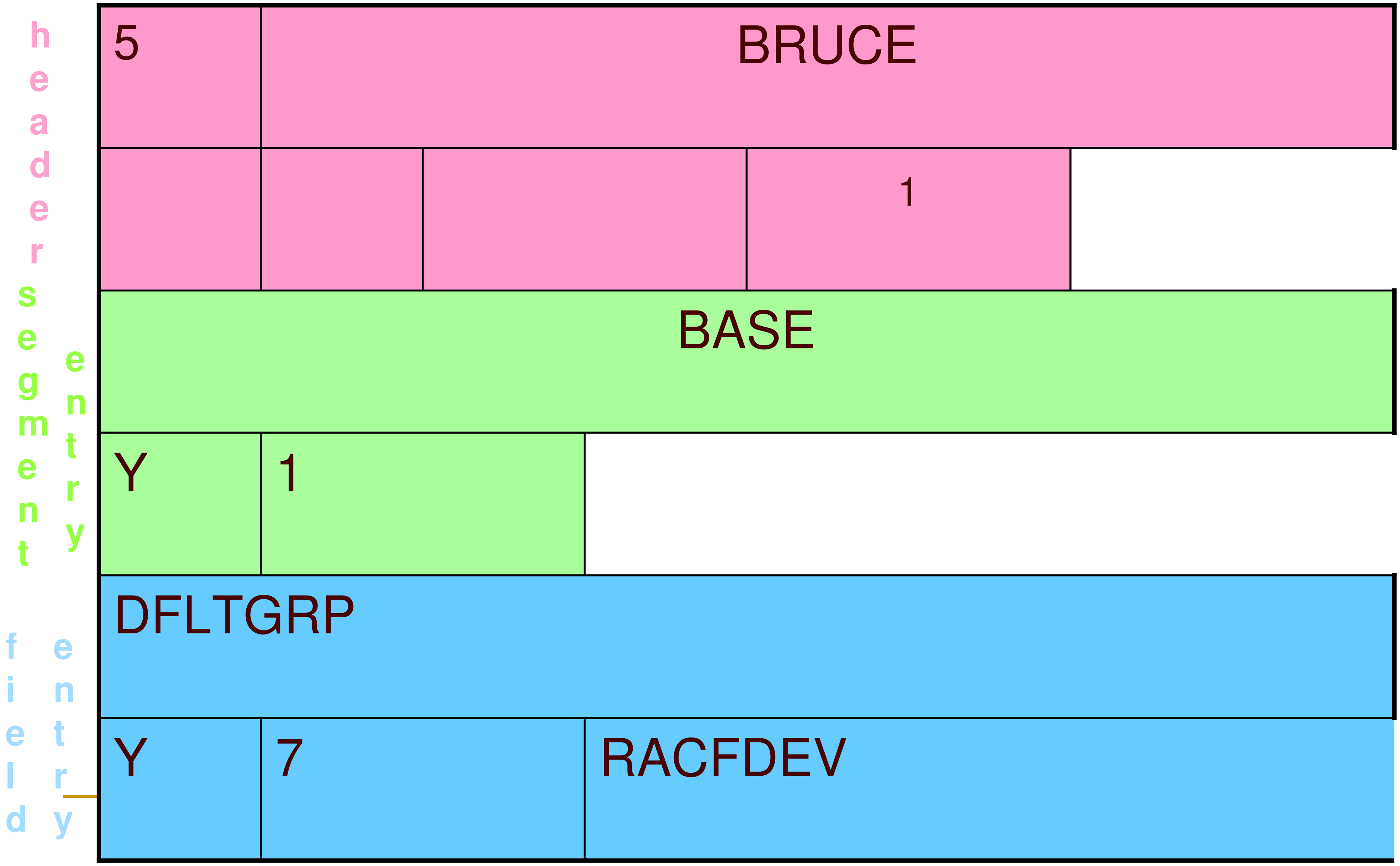
Tokenized input format



Detailed mapping for USER request



Detailed mapping … example



Code Example: Add user BRUCE

```
HEADER DC AL1(5),CL8'BRUCE',AL1(0),AL2(0),AL2(2)
BSEG   DC CL8'BASE',CL1'Y',AL2(3)
BFLD1  DC CL8'NAME',CL1'Y',AL2(13),CL13'''BRUCE WELLS'''
BFLD2  DC CL8'OWNER',CL1'Y',AL2(7),CL7'RACFDEV'
BFLD3  DC CL8'SPECIAL',CL1'Y',AL2(0)
OSEG   DC CL8'OMVS',CL1'Y',AL2(3)
OFLD1  DC CL8'UID',CL1'Y',AL2(4),CL4'3500'
OFLD2  DC CL8'HOME',CL1'Y',AL2(10),CL10'/u/brwells'
OFLD3  DC CL8'PROGRAM',CL1'Y',AL2(7),CL7'/bin/sh'
```

Is the equivalent of:

ADDUSER BRUCE NAME('BRUCE WELLS') OWNER(RACFDEV) SPECIAL OMVS(UID(3500) HOME(/u/brwells) PROGRAM(/bin/sh))

Profile Extract Functions

Profile extract functions

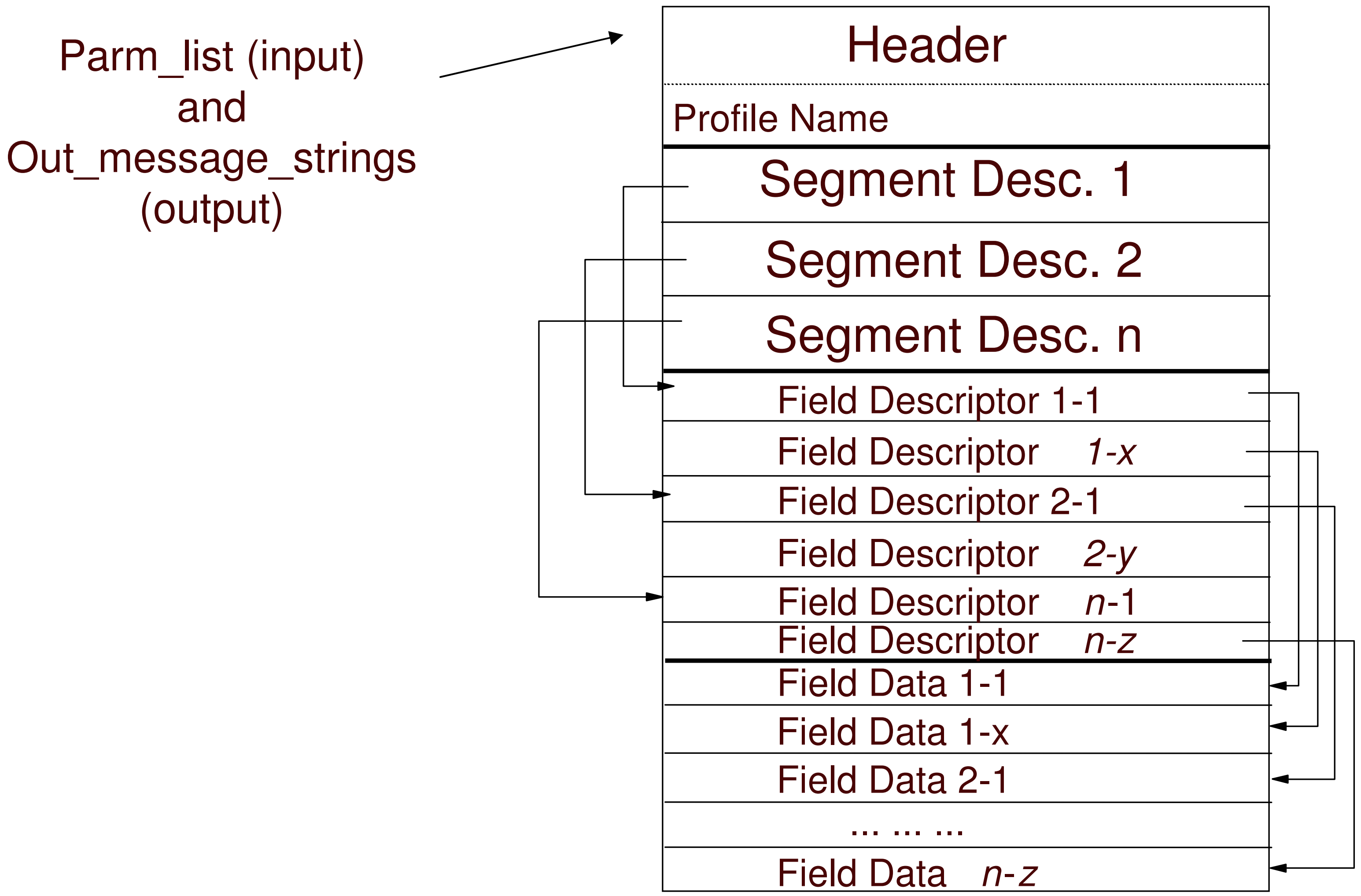
- Extract User, Group and Connect information from the RACF database in an architected format which is a programming interface
- No limit imposed on output size
- Requires same authority as LISTUSER/GRP
- All (authorized) profile data returned

Function codes	Authorization	RACF address space required
25-29	▪Command processor authorization ▪FACILITY - IRR.RADMIN.<cmd-name> (READ)	No

R_admin extract as a hybrid of a LISTUSER/GRP command and RACROUTE REQUEST=EXTRACT

Like RACROUTE (less filling)	**Like a command (tastes great)**
Format is architected (i.e. **supported**, unlike command output)	Returned data is character (EBCDIC)
Supervisor state caller can bypass authorization	Returned data is ‘symmetric’
Runs in caller’s address space (much faster than run-command)	Problem state enabled – requires same authorization as command
Can iteratively cycle through profiles	Suppresses fields not displayed by LISTUSER or LISTGRP

Profile extract output format



Input parameter list mapping

0			
8		version	
16			Profile name length
24			
32			Flags 1… Bypass authorization .1…BASE segment only
40			
48			
56			Profile name

Output parameter list mapping - header

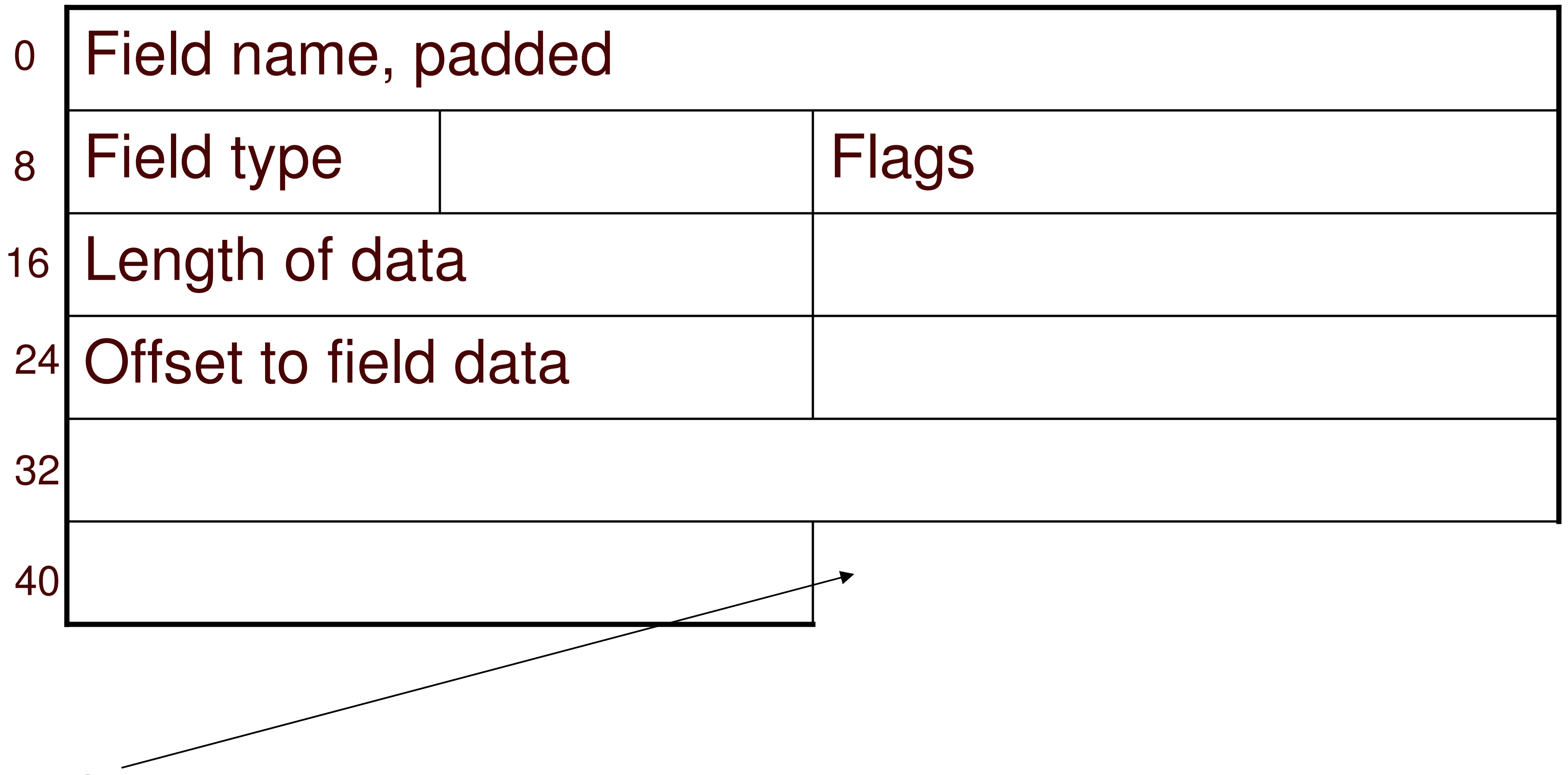
0	“PXTR” eye catcher			Length of output buffer
8	SP	version		… Class
16	… name			Profile name length
24				
32				Flags – cleared!
40	Number of segments			
48				
56				Profile name

Output parameter list mapping – segment descriptor

0	Segment name (e.g. “BASE”, “TSO”, etc) padded	
8	Flags (none currently)	Number of fields
16		Offset to 1st field descriptor
24		
32		

40 Start of next segment descriptor, or, if this is the final segment descriptor, then start of the first field descriptor

Output parameter list mapping – field descriptor



Start of next field descriptor, or, if this is the final field descriptor, then start of field data

Repeat Fields

- N-dimensional repeating data fields. E.G.
  - Class authority (CLAUTH) – 1-dimensional
  - Group connection in user profile – 15-dimensional
- Header field descriptor with unique name identifies
  - Number of occurrences of repeat field
  - Number of elements (dimension) in field
- Subsequent field descriptors for each constituent field, repeated as necessary

Output parameter list mapping – repeat field header descriptor

0	Field name, padded		
8	Field type		Flags
16	**Number of repeat field occurrences**		
24	**Number of elements (subfields) in repeat field**		
32			
40			

Start of first subfield descriptor

Repeat Field Schematic Example 1: Class authority

CLCNT	1-D	3 occurrences
CLAUTH	8 bytes	Offset to 1st class
CLAUTH	4 bytes	Offset to 2nd class
CLAUTH	8 bytes	Offset to 3rd class

Data: FACILITY USER UNIXPRIV

Repeat Field Schematic Example 2: Group profile member list

CONNECTS	2-D	3 occurrences
GUSERID	5 bytes	Offset to 1st user ID
GAUTH	4 bytes	Offset to 1st authority
GUSERID	5 bytes	Offset to 2nd user ID
GAUTH	3 bytes	Offset to 2nd authority
GUSERID	3 bytes	Offset to 3rd user ID
GAUTH	6 bytes	Offset to 3rd authority

Data: LARRY JOIN CURLY USE MOE CREATE

RACSEQ – Sample TSO command

- Uses R_admin extract functions to display user, group, or connection attributes
- Structured output format lends itself to use with REXX OUTTRAP
- Syntax:
  - RACSEQ CLASS(class) PROFILE(profile)
    - Profile is case-sensitive
- See RACF web page

```
RACSEQ CLASS(GROUP) PROFILE(RAPTORS)
Displaying profile RAPTORS in class GROUP. Segments:02
Segment: BASE Fields:08
SUPGROUP:SYS1
CREATDAT:04/18/06
OWNER :IBMUSER
TERMUACC:FALSE
DATA :BIRDS OF PREY KNOW THEY'RE COOL
Repeat field:SUBGRPCT Subfields:01 Occurrences:0004
SUBGROUP:HAWKS
---------------------------------------------
SUBGROUP:FALCONS
---------------------------------------------
SUBGROUP:EAGLES
---------------------------------------------
SUBGROUP:OWLS
---------------------------------------------
Repeat field:CONNECTS Subfields:02 Occurrences:0007
GUSERID :BRUCE
GAUTH :CONNECT
---------------------------------------------
GUSERID :KESTREL
GAUTH :USE
---------------------------------------------
GUSERID :OSPREY
GAUTH :USE
---------------------------------------------
GUSERID :REDTAIL
GAUTH :JOIN
---------------------------------------------
GUSERID :SAWWHET
GAUTH :CREATE
---------------------------------------------
GUSERID :HARRIER
GAUTH :USE
---------------------------------------------
GUSERID :SNOWY
GAUTH :USE
---------------------------------------------
UNIVERSL:FALSE
Segment: OMVS Fields:01
GID :4
```

RACSEQ – Sample output

“Next” requests

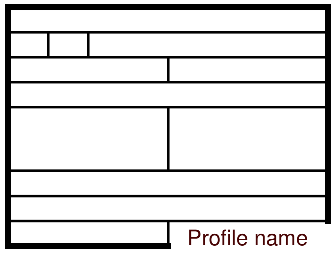
- For users and groups (not connections), you can iterate through the profiles by providing a starting value for profile name
  - Next name is returned, similar to ICHEINTY NEXT or RACROUTE REQUEST=EXTRACT TYPE=EXTRACTN
- The output of the *n*th request can be used as the input of the *n+1*th request
  - You need only re-specify flags, if desired

“Next” processing

1. Build the plist header. Specify a profile name of a single blank to start at the top.
2. Call IRRSEQ00 passing the plist in the Parm_list parameter. Output returned in Out_message_strings parameter.
3. Free original (or *n*-1) plist.
4. Process the output as appropriate.
5. (Re)set header flags, as appropriate
6. Call IRRSEQ00 with *n*-1 output as *n* input.
7. Iterate at step 3 until finished (RC 4/4/4).

“Next” Processing (with pictures)

Build Plist header

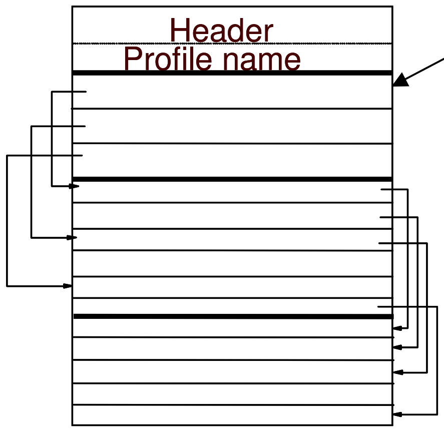


Call R_admin

```
CALL IRRSEQ00,(Work_area,
               ALET,SAF_return_code,
               ALET,RACF_return_code,
               ALET,RACF_reason_code,
               Function_code,
               Parm_list,
               RACF_userID,
               ACEE_ptr,
               Out_message_subpool,
               Out_message_strings
              ),VL
```

Free previous storage

Process output



Until done (SAF RC4, RACF RC4, RACF reason code 4 means no more profiles)

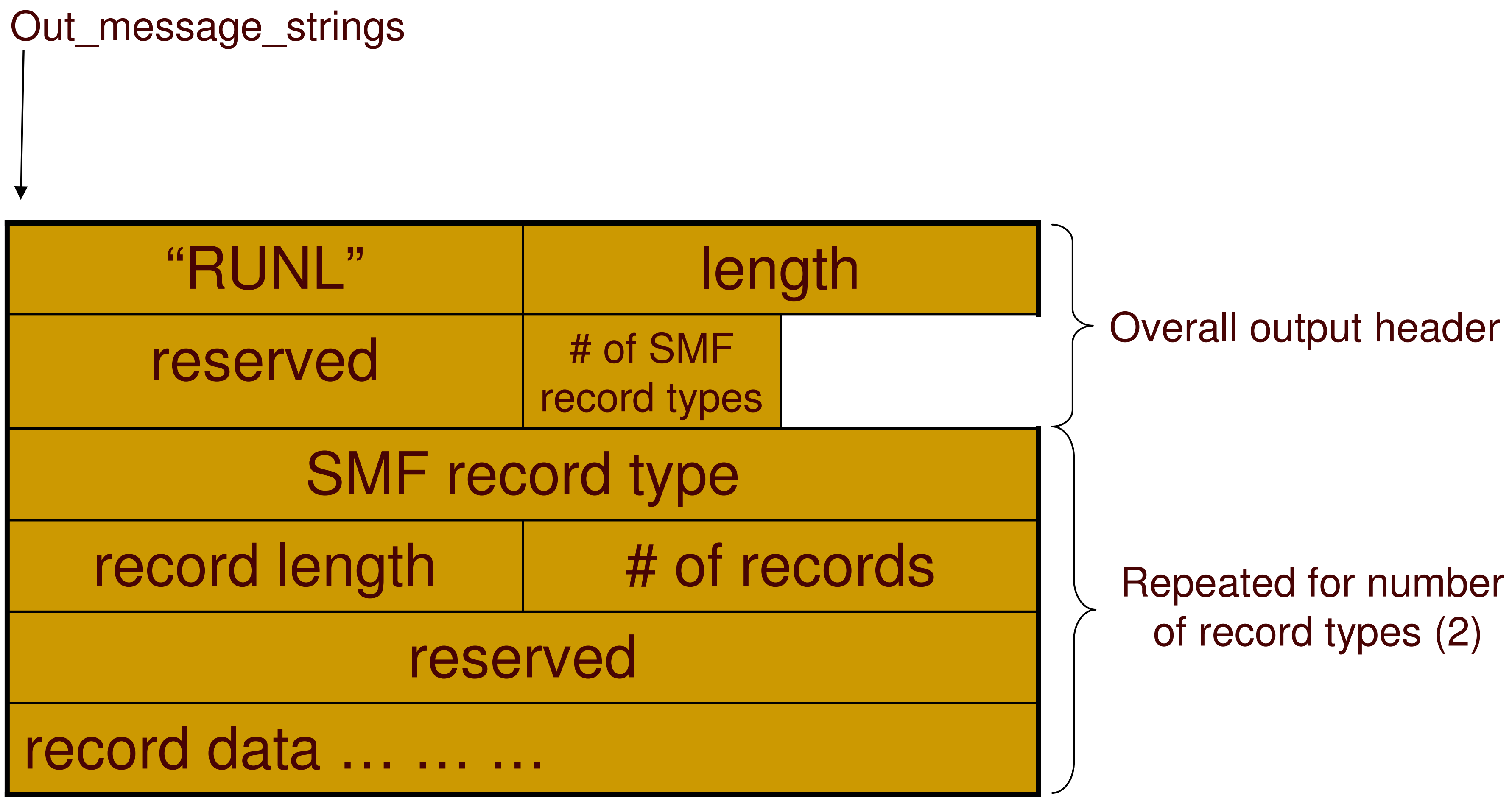
SETROPTS Reporting Functions

SETROPTS reporting functions

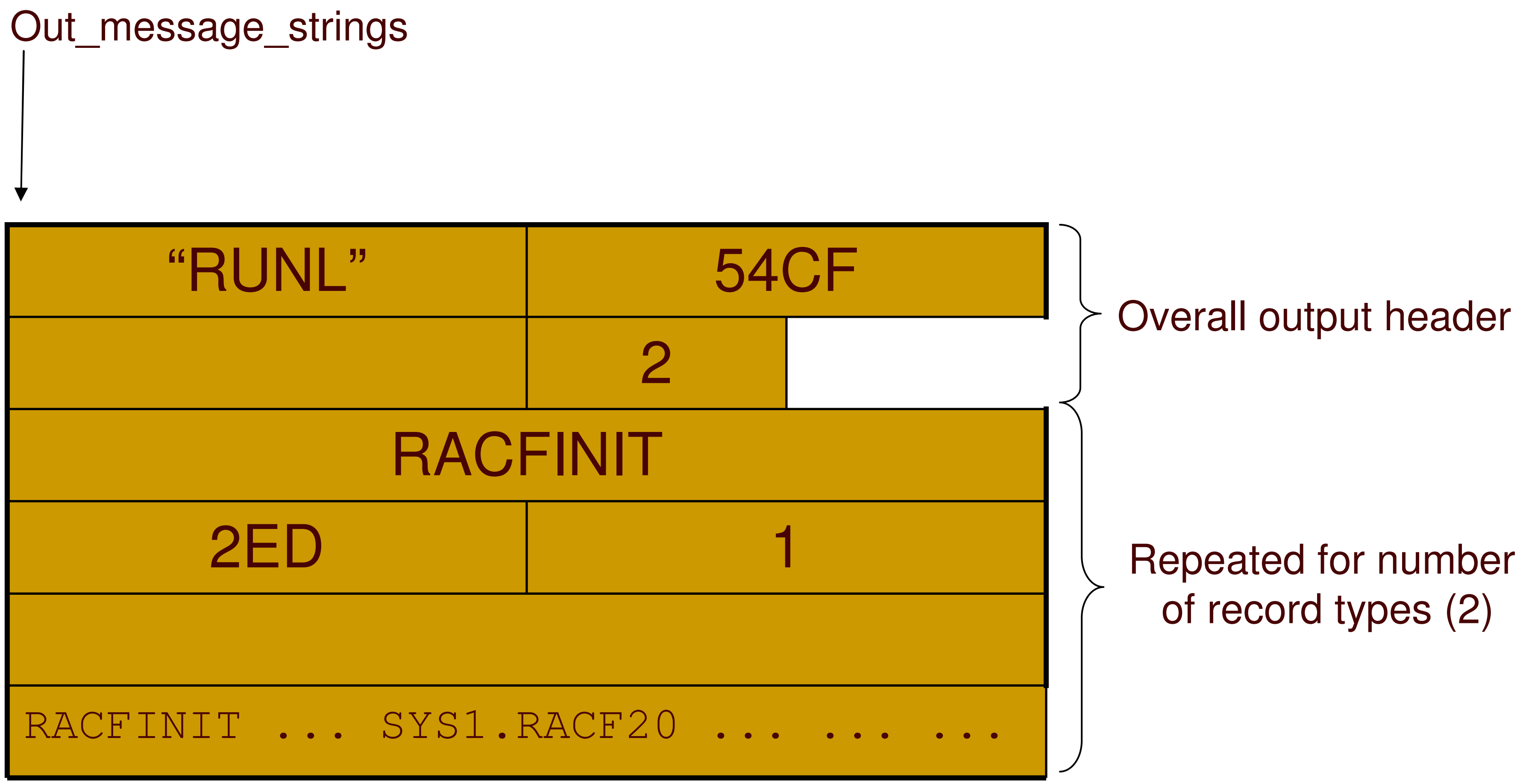
- Retrieve SETROPTS settings in one of two formats
  - SMF Unload (Type 81)
  - SETROPTS input format (tokenized)
    - Not the same as R7 extract format
      - Sorry!
- Very simple: no input parameter list required

Function codes	Authorization	RACF address space required
22, 23	▪Supervisor state ▪SETROPTS LIST authority *not* checked	No

SETROPTS unload format



SETROPTS unload format: Example


Out_message_strings
"RUNL"
54CF
2
RACFINIT
2ED
1
RACFINIT ... SYS1.RACF20 ... ...
Overall output header
Repeated for number of record types (2)

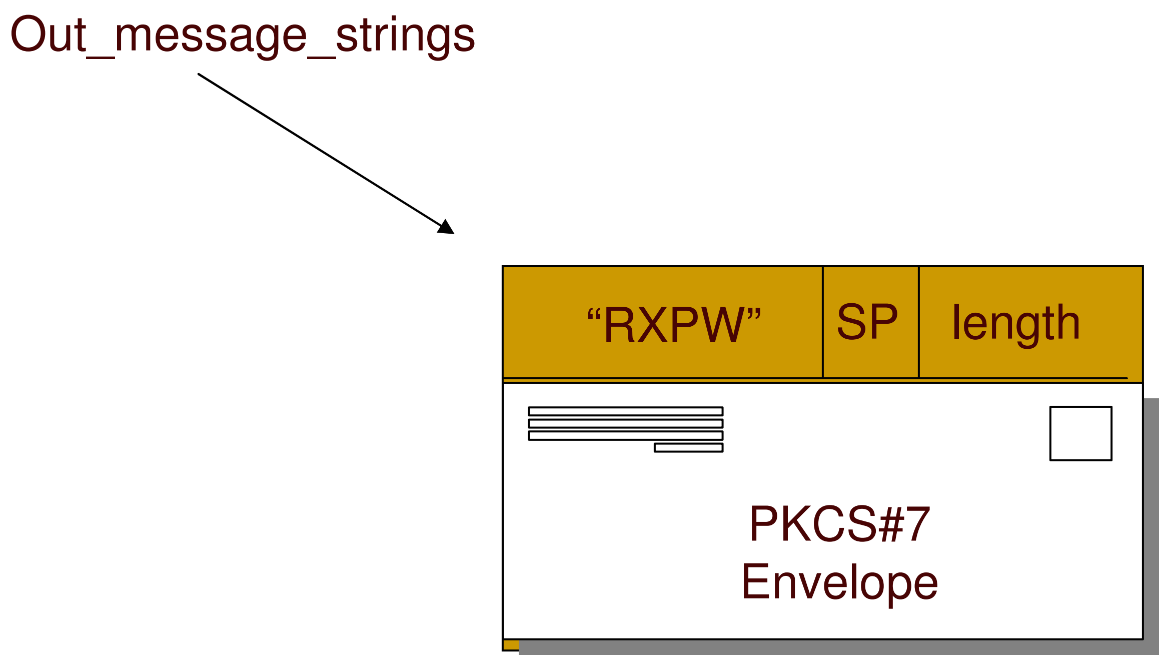
Password Envelope Retrieval

Password envelope retrieval

- Rather specialized (and sensitive) little function to extract a specified user’s PKCS#7 password envelope
  - From which the clear-text can be recovered
- Intended for password synchronization applications
  - Exploited by Tivoli Directory Integrator

Function code	Authorization	RACF address space required
24	▪Supervisor state ▪FACILITY - IRR.RADMIN.EXTRACT.PWENV (READ)	Yes

Password envelope format



Recap

- API overview
- Description of each of the functions
  - Run a RACF command
  - Extract user or group profile information
  - Extract SETROPTS settings
  - Retrieve a password envelope

References

- RACF Callable Services
- Command Language Reference
  - http://publibz.boulder.ibm.com/cgi-bin/bookmgr_OS390/Shelves/ICHZBK80
- RACF Downloads page – Sample R_admin extract program (RACSEQ)
  - http://www-03.ibm.com/servers/eserver/zseries/zos/racf/goodies.html