

PROGRMDOC
 PROGRAM DOC

AN OVERVIEW OF SYSTEMS FOR PROGRAMMING MUSIC AT EMS, STOCKHOLM.

740930 ZH

THERE EXIST SEVERAL WAYS OF PROGRAMMING MUSIC AT EMS:

EMS1 IS A LANGUAGE WITH TERMS FOR STUDIO DEVICES.
 EMSDEV IS A SYSTEM FOR PROGRAMMING IN FORTRAN ("EMSDEVICES")
 EXTENS IS A TRANSLATION PROGRAM FOR CODE MADE AT A FOREIGN COMPUTER
 ("EXTERNAL TO EMS")
 EMSFOR IS A SYSTEM TO COMBINE EMS1 AND FORTRAN ("EMS FORTRAN")
 SYNTAL, MADE AND IMPLEMENTED BY WAYNE SLAWSON, IS A HIGH-LEVEL
 LANGUAGE FOR DETERMINISTIC COMPOSITION.
 MUSIC BOX IS A HIGH-LEVEL, MESSAGE-ORIENTED LANGUAGE FOR ALEATORIC
 COMPOSITION.
 GARY NELSON FROM PERDUE UNIVERSITY HAS DONE SOME WORK
 ON COMBINING CERTAIN MUSIC4 ROUTINES WITH EMSDEV INTO A SYSTEM CALLED
 MUSIC15.

THE EMS1 LANGUAGE CORRESPONDS CLOSELY TO THE HARDWARE DEVICES IN THE
 LARGE STUDIO. IT HAS THE PEDAGOGIC ADVANTAGE FOR BEGINNERS IN
 PROGRAMMING THAT THE RESULT OF SIMPLE DEVICE TERMS IN EMS1 CAN BE
 SEEN AND HEARD VERY EASILY IN THE STUDIO. NOT SO MANY FORMALITIES
 ARE NEEDED, AND THE GAP FROM PROGRAMMING TO HEARING IS NOT SO LARGE.
 YOU CAN SIT AND USE EMS1 INTERACTIVELY, CREATE A SOUND OBJECT, PLAY IT,
 SAVE IT WITH A NAME AND USE IT LATER IN THE SAME OR ANY OTHER RUN.
 IN ADDITION TO DEVICE TERMS AND OBJECT MANAGEMENT COMMANDS THERE ARE
 TERMS FOR GLISSANDI, SOUND LEVEL ENVELOPES AND MOVING SOUNDS.
 MACROS CAN BE USED TO SHORTEN REPETITIVE TEXT.

EXAMPLE: TO GIVE FREQUENCY GENERATOR 6 A TYPICAL FREQUENCY, INTENSITY
 AND WAVESHAP AND MAKE IT AUDIABLE ON AN OUTPUT CHANNEL

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FG(6,440,80,3)>CHA(1,100);
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EMSDEV IS A MODERNISED VERSION OF THE OLDER PROGRAMS EMSALL AND
 EMSTOT, WHICH USE OLDER NOTATIONS IN SWEDISH AND ENGLISH, RESPECTIVELY.
 THESE WERE THE FIRST WORKING SYSTEMS AT EMS.
 THE EMS DEVICES CORRESPOND TO SUBROUTINES, WHICH ARE CALLED FROM
 THE USER'S FORTRAN PROGRAM.
 THE WAY OF SETTING A GENERATOR AS ABOVE IS IN EMSDEV

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CALL FG(6,440,80,3)
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TO CONNECT THE DEVICE TO AN OUTPUT CHANNEL

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CALL CONNec(FG6,CHA1)
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WHERE FG6 AND CHA1 ARE INTEGER DEVICE NUMBERS.
 TO SET A LEVEL ON CHANNEL 1

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CALL AMPL(CHA1,100)
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THE NOTATION TO LET THIS SETTING LAST FOR HALF A SECOND IS

CALL TIME(500)

THE FULL REPORTOIRE OF LOOPS AND SUBROUTINES IN FORTRAN IS AVAILABLE TO DESCRIBE COMPOSITION RULES, BUT IT TAKES SOME SKILL IN PROGRAMMING TO SYNCHRONIZE PARALLEL EVENTS. THE PROCEDURE IS: COMPILE, LOAD AND EXECUTE THE PROGRAM (AS DESCRIBED IN THE PAPER KNOWHW DKU). THE RESULT IS OUTPUT TO A DIGITAL MAGNETIC TAPE (9-CHANNEL INDUSTRY STANDARD) THAT CAN BE PLAYED IN THE STUDIO, ON LINE OR OFF LINE.

THE EMSFOR SYSTEM IS PRESENTLY BEING EXPANDED TO INCLUDE EMSDEV NOTATION, MAKE AVAILABLE STANDARD ENVELOPES AND MOVING SOUND AND OFFER OBJECT STRUCTURING.

UNTIL THEN, DEVICES CAN BE DECLARED ON THE EMS1 LEVEL TO BE CONTROLLED FROM FORTRAN AS DESCRIBED BELOW AND IN THE PAPER EMSFOR DOC.

AN EXAMPLE: THE NOTATION IN EMS1 TO EXPRESS THAT THE FREQUENCY OF GENERATOR 2 SHOULD BE FORTRAN CONTROLLED FROM THE LOCAL TIME 5 1/2 SECONDS IS

LT(5,500) FG(2,FOR)

OPTIONALLY, A PARAMETER COULD BE TRANSFERRED FROM EMS1 TO FORTRAN BY E.G.

FG(2,FOR+17)

THERE IS ALSO AN ARRAY THAT CAN BE ACCESSED FROM EITHER EMS1 OR FORTRAN. THE CODEGENERATION PROGRAM IN EMS1 (AS OPPOSED TO THE COMPILATION PART) CALLS FORTRAN ONCE FOR EACH FORTRAN-CONTROLLED DEVICE AND THEN AT DIFFERENT TIME SAMPLES AS FREQUENT AS IS REQUESTED BY THE FORTRAN PROGRAM. THE FORTRAN PROGRAM HAS ACCESS TO INFORMATION ABOUT WHICH DEVICE IT IS TIME TO SERVICE, THE OPTIONAL ARGUMENT THAT WAS ONCE GIVEN IN EMS1 AND THE CURRENT TIME AND STUDIOVALUE. THE ADDITIONAL FORTRAN PROGRAMS MUST BE CHAINED INTO THE USUAL EMS1-SYSTEM BEFORE THE RUN STARTS.

THE FACILITY IN EMS1 TO ENTER USER'S FORTRAN ROUTINES IS SOMEWHAT SIMILAR TO A POSSIBILITY OF MUSIC4 AND ITS RELATIVES. EMS1, WHICH ORDINARILY OPERATES ON THE MACRO LEVEL, IN THIS WAY ALSO BECOMES POWERFUL ON THE OBJECT TIME LEVEL. RANDOM AND TRIGONOMETRIC FUNCTIONS ALSO BECOME AVAILABLE. AFTER AN INITIALIZATION ON THE EMS1 LEVEL IT IS POSSIBLE TO WRITE ALL OF THE COMPOSITION, OR ANY PART OF IT, IN FORTRAN. THIS INCLUDES SEQUENCE CONTROL, LETTING EACH DEVICE LIVE ITS OWN LIFE OR COMMUNICATE WITH ITS COLLEAGUES IN SIMULATED TIME.

EXTENS IS ANOTHER SYSTEM THAT CONVERTS STRAIGHT CODE INTO STUDIO CODE AND PUTS IT ON MAGNETIC TAPE. THE INPUT CODE, WHICH SHOULD BE IN ASCII CODE EITHER ON PAPER TAPE OR PDP-15 COMPATIBLE DECTAPE, LOOKS LIKE:

C7219

TO CONNECT DEVICES 72 AND 19

A1910000 TO GIVE DEVICE 19 THE LEVEL 100 DB
 G0600440000003 TO SET FREQUENCY GENERATOR 6
 T00500 TO GIVE TIME

THE EXAMPLE IS THE SAME AS ABOVE.
 EXTEMS GENERATES CALLS TO THE EMSDEV PACKAGE.
 (SYNTET IS AN OLDER VERSION THAT CALLS EMSTOT.)

A SUMMARY OF THE POSSIBLE FORMATS OF COMMUNICATING WITH EMS.

ANY VISITOR WHO KNOWS THE STUDIO COULD PREPARE MATERIAL AT HOME.
 HE OR SHE CAN BRING ASCII-CODED PAPER TAPE, OR IF HE (SHE) HAPPENS
 TO HAVE ACCESS TO A PDP-15, SO CALLED DEC-TAPES, THE MATERIAL COULD
 BE:

- 1) EMS1-TEXT. SINCE THERE IS ONLY ONE IMPLEMENTATION OF EMS1, THE SYNTAX CAN BE CHECKED ONLY IN STOCKHOLM.
- 2) FORTRAN PROGRAMS FOR EMSDEV OR EMS1. THESE CAN BE RUN AND TESTED AT ANOTHER COMPUTER, BUT THERE EXIST INCOMPATIBILITIES BETWEEN DIFFERENT FORTRAN VERSIONS, SO IT IS GOOD TO CONSULT A PDP MANUAL.
- 3) COMPACTLY CODED CONTROL SIGNALS TO BE READ BY THE EXTEMS PROGRAM. THE ADVANTAGE IS THE STRAIGHTFORWARD RUN. THERE IS NO COMPILATION AT EMS. ALL PRETESTING CAN BE DONE AT ANY COMPUTER. EMS COULD EVEN CONVERT A PAPER TAPE SENT BY MAIL AND SEND AN AUDIO TAPE BACK.
- 4) SYNTAL TEXT. THERE ARE SOME OTHER IMPLEMENTATIONS OF SYNTAL IN THE WORLD, BUT EMS DOES NOT HAVE THE DETAILS.
- 5) THIS WOULD BE TO GENERATE A MAGNETIC TAPE AT INDUSTRY STANDARD WITH THE STUDIOCODE OF EMS, TO BE PLAYED DIRECTLY. THIS IS VERY DIFFICULT.

THE FOLLOWING DOCUMENTATION IS AVAILABLE:

PROGRM DOC	(THIS PAPER)
EMS1 INT	AN INTRODUCTION TO EMS1
EMS1 MAN	THE BASIC DOCUMENTATION IN ENGLISH
MATERIAL FOR A COMPLETE COURSE IN THE STUDIO AND EMS1 (IN SWEDISH).	
EMSFOR DOC	THE LINKING OF EMS1 AND FORTRAN
EMSDEV DOC	
EMSEDP DKU	A DUMP PROGRAM FOR USE WITH EMSDEV
EXTEMS DOC	
A1/A2 DKU	THE PLAY PROGRAM
KNOWHW DOC	HOW TO FIND YOUR WAY IN THE USER'S GUIDE FOR PDP-15 WHEN USING EMSDEV
ENVPLT DOK	DOCUMENTATION IN SWEDISH FOR A PROGRAM THAT PLOTS INTENSITIES FOR MOVING SOUND
MOVS DOK	A DESCRIPTION IN SWEDISH OF MOVING SOUND IN EMS1. EMS1C MAN IS SAME THING IN ENGLISH

DECODE DKU, ENCODE DKU PROGRAMS TO REPLACE READ AND WRITE IN FORTRAN

SYNTAL A PAPER IN EITHER ENGLISH OR SWEDISH THAT PRESENTS
SYNTAL DKU THE SYNTAL LANGUAGE
WSLEO DKU

THESE DOCUMENTATION FILES CAN BE FOUND ON THE DECTAPE 'EMS DOC1',
ON 'EMS DOC2' IS

THE TECHNICAL DOCUMENTATION OF THE STUDIOCODE:

INTERF DKU
BINREP DKU
BINREP DEM

EMSTOT DKU
EMSALL DKU
SYNTET DKU

AND SOME LESS INTERESTING DOCUMENTATION.