

Publication date: 2014-08-04



VSIPL Core Profile

Version 1.5

OMG Document Number: formal/2014-08-03

Normative reference: <http://www.omg.org/spec/VSIPL>

1.1. Introduction

This document contains minimum requirements for a VSIPL compliant library meeting a profile called VSIPL Core, or just Core. This is a companion requirements document to the VSIPL specification. All functions and data types in the Core profile must meet all requirements for functions and data types as defined in the VSIPL specification.

1.2. Basic Data Types

This profile is a list of the (minimum) required functions to meet a VSIPL Core profile. Implementation of the profile requires the implementor to support VSIPL data types needed to implement the functions.

To meet the minimum requirement for a VSIPL Core profile the implementor need only support one float type, and one signed integer type.

The following scalar data types are listed as a convenience. In order to implement the functions of the Core profile in accordance with the VSIPL specification these scalars must be defined. Note that `_f` and `_i` denote some implementation dependent float type and some implementation dependent (signed) integer type respectively.

Data Type	Comments
<code>vsip_scalar_vi</code>	Scalar vector index.
<code>vsip_scalar_mi</code>	Scalar matrix index.
<code>vsip_scalar_bl</code>	Scalar boolean.
<code>vsip_scalar_f</code>	Only a single float type is needed.
<code>vsip_cscalar_f</code>	Only a single complex float type of precision matching <code>vsip_scalar_f</code> is needed.
<code>vsip_scalar_i</code>	A single signed integer type is needed

1.3. Function Profile for Core

1.3.1. Support Functions

All profiles must include `vsip_init` and `vsip_finalize` support functions. In addition, Core must include the following VSIPL support functions.

1.3.1.1. Block Support

The following set of functions are included for block support in Core.

<code>vsip_blockcreate_f</code>	<code>vsip_blockcreate_i</code>	<code>vsip_cblockcreate_f</code>
<code>vsip_blockbind_f</code>	<code>vsip_blockbind_i</code>	<code>vsip_cblockbind_f</code>
<code>vsip_blockfind_f</code>	<code>vsip_blockfind_i</code>	<code>vsip_cblockfind_f</code>
<code>vsip_blockdestroy_f</code>	<code>vsip_blockdestroy_i</code>	<code>vsip_cblockdestroy_f</code>
<code>vsip_blockadmit_f</code>	<code>vsip_blockadmit_i</code>	<code>vsip_cblockadmit_f</code>
<code>vsip_blockrelease_f</code>	<code>vsip_blockrelease_i</code>	<code>vsip_cblockrelease_f</code>
<code>vsip_blockrebind_f</code>	<code>vsip_blockrebind_i</code>	<code>vsip_cblockrebind_f</code>

vsip_blockcreate_bl	vsip_blockcreate_vi	vsip_blockcreate_mi
vsip_blockbind_bl	vsip_blockbind_vi	vsip_blockbind_mi
vsip_blockfind_bl	vsip_blockfind_vi	vsip_blockfind_mi
vsip_blockdestroy_bl	vsip_blockdestroy_vi	vsip_blockdestroy_mi
vsip_blockadmit_bl	vsip_blockadmit_vi	vsip_blockadmit_mi
vsip_blockrelease_bl	vsip_blockrelease_vi	vsip_blockrelease_mi
vsip_blockrebind_bl	vsip_blockrebind_vi	vsip_blockrebind_mi
vsip_cstorage		

Total functions are 43 for block support.

1.3.1.2. Vector View Support

The following set of functions are included for vector view support in Core.

vsip_vbind_f	vsip_vbind_i	vsip_cvbind_f
vsip_vcreate_f	vsip_vcreate_i	vsip_cvcreate_f
vsip_vdestroy_f	vsip_vdestroy_i	vsip_cvdestroy_f
vsip_valldestroy_f	vsip_valldestroy_i	vsip_cvalldestroy_f
vsip_vcloneview_f	vsip_vcloneview_i	vsip_cvcloneview_f
		vsip_vrealview_f
		vsip_vimagview_f
vsip_vsubview_f	vsip_vsubview_i	vsip_cvsubview_f
vsip_vgetattrib_f	vsip_vgetattrib_i	vsip_cvgetattrib_f
vsip_vgetblock_f	vsip_vgetblock_i	vsip_cvgetblock_f
vsip_vgetoffset_f	vsip_vgetoffset_i	vsip_cvgetoffset_f
vsip_vgetstride_f	vsip_vgetstride_i	vsip_cvgetstride_f
vsip_vgetlength_f	vsip_vgetlength_i	vsip_cvgetlength_f
vsip_vputattrib_f	vsip_vputattrib_i	vsip_cvputattrib_f
vsip_vputoffset_f	vsip_vputoffset_i	vsip_cvputoffset_f
vsip_vputstride_f	vsip_vputstride_i	vsip_cvputstride_f
vsip_vputlength_f	vsip_vputlength_i	vsip_cvputlength_f
vsip_vget_f	vsip_vget_i	vsip_cvget_f
vsip_vput_f	vsip_vput_i	vsip_cvput_f
vsip_vbind_bl	vsip_vbind_vi	vsip_cvbind_mi
vsip_vcreate_bl	vsip_vcreate_vi	vsip_cvcreate_mi
vsip_vdestroy_bl	vsip_vdestroy_vi	vsip_cvdestroy_mi
vsip_valldestroy_bl	vsip_valldestroy_vi	vsip_cvalldestroy_mi
vsip_vcloneview_bl	vsip_vcloneview_vi	vsip_cvcloneview_mi
vsip_vsubview_bl	vsip_vsubview_vi	vsip_cvsubview_mi
vsip_vgetattrib_bl	vsip_vgetattrib_vi	vsip_cvgetattrib_mi
vsip_vgetblock_bl	vsip_vgetblock_vi	vsip_cvgetblock_mi

vsip_vgetoffset_bl	vsip_vgetoffset_vi	vsip_cvgetoffset_mi
vsip_vgetstride_bl	vsip_vgetstride_vi	vsip_cvgetstride_mi
vsip_vgetlength_bl	vsip_vgetlength_vi	vsip_cvgetlength_mi
vsip_vputattrib_bl	vsip_vputattrib_vi	vsip_cvputattrib_mi
vsip_vputoffset_bl	vsip_vputoffset_vi	vsip_cvputoffset_mi
vsip_vputstride_bl	vsip_vputstride_vi	vsip_cvputstride_mi
vsip_vputlength_bl	vsip_vputlength_vi	vsip_cvputlength_mi
vsip_vget_bl	vsip_vget_vi	vsip_cvget_mi
vsip_vput_bl	vsip_vput_vi	vsip_cvput_mi

Total functions are 104 for vector view support.

1.3.1.3. Vector View Copy Support

The following vector copy functions are included as part of the VSIPL Core Profile.

vsip_vcopy_f_f	vsip_vcopy_vi_i
vsip_vcopy_f_i	vsip_vcopy_mi_mi
vsip_vcopy_i_f	vsip_vcopy_bl_bl
vsip_cvcopy_f_f	vsip_vcopy_bl_f
vsip_vcopy_i_i	vsip_vcopy_f_bl
vsip_vcopy_vi_vi	
vsip_vcopy_i_vi	

Total functions are 12 for copy support.

1.3.1.4. Matrix View Support

The following matrix view support functions are included in the VSIPL Core profile.

vsip_mbind_f	vsip_cmbind_f
vsip_mcreate_f	vsip_cmcreate_f
vsip_mdestroy_f	vsip_cmdestroy_f
vsip_malldestroy_f	vsip_cmalldestroy_f
vsip_mcloneview_f	vsip_cmcloneview_f
vsip_msubview_f	vsip_cmsubview_f
	vsip_mrealview_f
	vsip_mimagview_f
vs ip_mrowview_f	vsip_cmrowview_f
vs ip_mcolview_f	vsip_cmcolview_f
vs ip_mdiagview_f	vsip_cmdiagview_f
vs ip_mtransview_f	vsip_cmtransview_f
vsip_mgetattrib_f	vsip_cmgetattrib_f
vsip_mgetblock_f	vsip_cmgetblock_f
vsip_mgetoffset_f	vsip_cmgetoffset_f

vsip_mgetrowstride_f	vsip_cmgetrowstride_f
vsip_mgetcolstride_f	vsip_cmgetcolstride_f
vsip_mgetrowlength_f	vsip_cmgetrowlength_f
vsip_mgetcollength_f	vsip_cmgetcollength_f
vsip_mputattrib_f	vsip_cmputattrib_f
vsip_mputoffset_f	vsip_cmputoffset_f
vsip_mputrowstride_f	vsip_cmputrowstride_f
vsip_mputcolstride_f	vsip_cmputcolstride_f
vsip_mputrowlength_f	vsip_cmputrowlength_f
vsip_mputcollength_f	vsip_cmputcollength_f
vsip_mget_f	vsip_cmget_f
vsip_mput_f	vsip_cmput_f

Total functions are 52 for matrix view support.

1.3.1.5. Matrix View Copy Support

The following matrix copy functions are included in the VSIPL Core profile.

vsip_mcopy_f_f	vsip_cmcopy_f_f
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Total functions are 2 for matrix copy support.

1.3.2. Scalar functions

The following functions are included for real scalar support in the VSIPL Core profile.

vsip_matindex_mi	vsip_MATINDEX_mi
vsip_rowindex_mi	vsip_colindex_mi

The following functions are included for complex scalar support in the VSIPL Core profile.

vsip_arg_f		
vsip_cadd_f	vsip_rcadd_f	
vsip_conj_f		
vsip_cdiv_f		vsip_crdiv_f
vsip_cexp_f		
vsip_cjmul_f		
vsip_cmag_f		
vsip_cmagsq_f		
vsip_cmplx_f		
vsip_cmul_f	vsip_rcmul_f	
vsip_cneg_f		
vsip_crecip_f		
vsip_csub_f	vsip_rsub_f	vsip_crsub_f
vsip_csqrt_f		

vsip_imag_f		
vsip_polar_f		
vsip_real_f		
vsip_rect_f		
vsip_CADD_f	vsip_RCADD_f	
vsip_CONJ_f		
vsip_CDIV_f		vsip_CRDIV_f
vsip_CEXP_f		
vsip_CJMUL_f		
vsip_CMUL_f	vsip_RCMUL_f	
vsip_CNEG_f		
vsip_CRECIP_f		
vsip_CSUB_f	vsip_RCSUB_f	vsip_CRSUB_f
vsip_CSQRT_f		
vsip_CMPLX_f		

The following functions are included for random number scalar support in the VSIPL Core profile.

vsip_randu_f	vsip_crandu_f
vsip_randn_f	vsip_crandn_f

Total functions are 47 for scalar support.

1.3.3. Vector Elementwise Functions

The following vector and elementwise functions are included in the VSIPL Core profile.

vsip_vacos_f		
vsip_vasin_f		
vsip_vatan_f		
vsip_vatan2_f		
vsip_vcos_f		
vsip_vexp_f	vsip_cvexp_f	
vsip_vexp10_f		
vsip_vlog_f		
vsip_vlog10_f		
vsip_vsin_f		
vsip_vsqrt_f	vsip_cvsqrt_f	
vsip_vtan_f		
	vsip_cvconj_f	
	vsip_veuler_f	
vsip_vmag_f	vsip_cvmag_f	
	vsip_vcmagsq_f	

1.3.3 [Vector Elementwise Functions]

vsip_vmeanval_f	vsip_cvmeanval_f	
vsip_vmeansqval_f	vsip_cvmeansqval_f	
vsip_vneg_f	vsip_cvneg_f	
vsip_vrecip_f	vsip_cvrecip_f	
vsip_vrsqrt_f		
vsip_vsq_f		
vsip_vsumval_f		
vsip_vsumsqval_f		
vsip_vadd_f	vsip_cvadd_f	vsip_rcvadd_f
vsip_svadd_f	vsip_csvadd_f	vsip_rscvadd_f
	vsip_cvjdot_f	
vsip_vdiv_f	vsip_cvdiv_f	
vsip_svdiv_f		
vsip_vdot_f	vsip_cvdot_f	
vsip_vhypot_f		
	vsip_cvjmul_f	
vsip_vmul_f	vsip_cvmul_f	vsip_rcvmul_f
vsip_vmmul_f	vsip_cvmmul_f	vsip_rvcmmul_f
vsip_svmul_f	vsip_csvmul_f	vsip_rscvmul_f
vsip_vsub_f	vsip_cvsub_f	vsip_rcvsub_f
		vsip_crvsub_f
vsip_svsub_f	vsip_csvsub_f	vsip_rscvsub_f
vsip_vam_f	vsip_cvam_f	
vsip_vma_f	vsip_cvma_f	
vsip_vmsa_f	vsip_cvmsa_f	
vsip_vmsb_f	vsip_cvmsb_f	
vsip_vsam_f	vsip_cvsam_f	
vsip_vsbm_f	vsip_cvsbm_f	
vsip_vsma_f	vsip_cvsma_f	
vsip_vsmsa_f	vsip_cvsmsa_f	
vsip_vleq_f		
vsip_vlge_f		
vsip_vlgt_f		
vsip_vlle_f		
vsip_vllt_f		
vsip_vlne_f		
vsip_vclip_f		
vsip_vinvelip_f		
vsip_vmax_f		

vsip_vmaxmg_f		
	vsip_vcmaxmgsq_f	
	vsip_vcmaxmgsqval_f	
vsip_vmaxmgval_f		
vsip_vmaxval_f		
vsip_vmin_f		
vsip_vminmg_f		
	vsip_vcminmgsq_f	
	vsip_vcminmgsqval_f	
vsip_vminmgval_f		
vsip_vminval_f		
vsip_vfill_f	vsip_cvfill_f	
vsip_vramp_f		
	vsip_vcplx_f	
vsip_vexpoavg_f	vsip_cvexpoavg_f	
vsip_vgather_f	vsip_cvgather_f	
	vsip_vimag_f	
	vsip_cvmodulate_f	vsip_vmodulate_f
	vsip_vpolar_f	
	vsip_vreal_f	
	vsip_vrect_f	
vsip_vscatter_f	vsip_cvscatter_f	
vsip_vswap_f	vsip_cvswap_f	

The following functions are required for random support in the VSIPL Core profile.

vsip_vrandu_f	vsip_cvrandu_f
vsip_vrandn_f	vsip_cvrandn_f
vsip_randcreate	vsip_randdestroy

The following integer functions are required to support integer calculation in the VSIPL Core profile.

vsip_vmag_i	vsip_vclip_i
vsip_vneg_i	vsip_vinvelip_i
vsip_vadd_i	vsip_vand_i
vsip_svadd_i	vsip_vnot_i
vsip_vmul_i	vsip_vor_i
vsip_svmul_i	vsip_vxor_i
vsip_vsub_i	vsip_vfill_i
vsip_svsb_i	vsip_vramp_i
vsip_vgather_i	vsip_vscatter_i

The following boolean functions are required for boolean support in the VSIPL Core profile.

vsip_vsumval_bl	vsip_vand_bl
vsip_valltrue_bl	vsip_vnot_bl
vsip_vanytrue_bl	vsip_vor_bl
vsip_vindexbool	vsip_vxor_bl

A total of 147 functions in vector and elementwise.

1.3.4. Signal Processing Functions

Core requires support for the following signal processing functions.

Table 1.1. Fast Fourier Transform

vsip_ccfftop_f	vsip_ccfftop_create_f	
vsip_ccfftip_f	vsip_ccfftip_create_f	
vsip_rcfftop_f	vsip_rcfftop_create_f	vsip_fft_getattr_f
vsip_crfftop_f	vsip_crfftop_create_f	vsip_fft_destroy_f
vsip_ccfftmop_f	vsip_ccfftmop_create_f	
vsip_ccfftmip_f	vsip_ccfftmip_create_f	
vsip_rcfftmop_f	vsip_rcfftmop_create_f	vsip_fftm_getattr_f
vsip_crfftmop_f	vsip_crfftmop_create_f	vsip_fftm_destroy_f

Table 1.2. Window Creation Functions

vsip_vcreate_hanning_f
vsip_vcreate_blackman_f
vsip_vcreate_kaiser_f
vsip_vcreate_cheby_f

Table 1.3. FIR Filter Functions

vsip_fir_create_f	vsip_cfir_create_f
vsip_firflt_f	vsip_cfirflt_f
vsip_fir_destroy_f	vsip_cfir_destroy_f
vsip_fir_getattr_f	vsip_cfir_getattr_f

Table 1.4. Convolution Function

vsip_conv1d_create_f	
vsip_convolve1d_f	
vsip_conv1d_destroy_f	
vsip_conv1d_getattr_f	

Table 1.5. Correlation Functions

vsip_corr1d_create_f	vsip_ccorr1d_create_f
vsip_correlate1d_f	vsip_ccorrelate1d_f

vsip_corr1d_destroy_f	vsip_ccorr1d_destroy_f
vsip_corr1d_getattr_f	vsip_ccorr1d_getattr_f

Table 1.6. Histogram Function

vsip_vhisto_f

A total of 45 functions in Signal Processing.

1.3.5. Linear Algebra Functions

Core requires the following functions for linear algebra manipulation.

Table 1.7. Matrix Products

vsip_vmprod_f	vsip_mprodt_f	vsip_cmprodt_f
vsip_cvmprod_f		vsip_cmprodh_f
vsip_mvprod_f	vsip_mprod_f	vsip_cmprod_f
vsip_cmvprod_f		vsip_cmprodj_f

Table 1.8. Matrix Transposes

vsip_mtrans_f	vsip_cmtrans_f
	vsip_cmherm_f

Table 1.9. General Matrix Product and Sum and Special Matrix Products

vsip_gemp_f	vsip_cgemp_f
vsip_gems_f	vsip_cgems_f
vsip_vouter_f	vsip_cvouter_f

Table 1.10. LU Decomposition

vsip_lud_create_f	vsip_clud_create_f
vsip_lud_f	vsip_clud_f
vsip_lud_getattr_f	vsip_clud_getattr_f
vsip_lusol_f	vsip_clusol_f
vsip_lud_destroy_f	vsip_clud_destroy_f

Table 1.11. Cholesky

vsip_chold_f	vsip_cchold_f
vsip_chold_create_f	vsip_cchold_create_f
vsip_cholsol_f	vsip_ccholsol_f
vsip_chold_getattr_f	vsip_cchold_getattr_f
vsip_chold_destroy_f	vsip_cchold_destroy_f

Table 1.12. QRD

vsip_qrd_f	vsip_cqrd_f
vsip_qrd_create_f	vsip_cqrd_create_f

vsip_qrsol_f	vsip_cqrsol_f
vsip_qrdprodq_f	vsip_cqrdprodq_f
vsip_qrdsolr_f	vsip_cqrdsolr_f
vsip_qrd_getattr_f	vsip_cqrd_getattr_f
vsip_qrd_destroy_f	vsip_cqrd_destroy_f

Table 1.13. Special Solvers

vsip_toepsol_f	vsip_ctoepsol_f
vsip_covsol_f	vsip_ccovsol_f
vsip_llsqsol_f	vsip_cllsqsol_f

A total of required 59 functions in Linear Algebra.

A total of 513 functions are in the VSIPL Core Profile.