

SoLID Software Plans

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SoLID Collaboration Meeting
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Main Software Components

- Infrastructure
 - ▶ Framework
 - ▶ Services (databases)
 - ▶ Packaging, version control
 - ▶ User development environment (SDK)
 - ▶ Job control, workflow tools
- Simulations
 - ▶ Physics generators
 - ▶ Data model
 - ▶ Particle transport (Geant4)
 - ▶ Framework integration
 - ▶ Digitization
- Reconstruction/analysis
 - ▶ Decoder
 - ▶ Detector DSP
 - ▶ Track reconstruction
 - ▶ Particle ID
 - ▶ Calibrations, alignment, efficiencies

Framework Candidate: *art*

- Pros

- ▶ Ready now
- ▶ **Wide adoption**, including major collaborations
- ▶ End-to-end
- ▶ Geant4 integration demonstrated
- ▶ **Multi-threaded** (art 3)
- ▶ Good documentation → reduced need for support

- Annoyances, limitations . . .

- ▶ Requires very recent compiler (C++17)
- ▶ FHiCL configuration language not programmable (switch to Python under consideration)
- ▶ Lack of **backward compatibility** between versions
- ▶ Not “distributed” (no “**horizontal scaling**”), cf. CLARA
- ▶ Suitability for **streaming readout** analysis to be evaluated

Task List for Framework Adoption

<https://redmine.jlab.org/projects/art-jlab>

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art @ JLab

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#	Tracker	Status	Priority	Subject	Updated	% Done	Estimated time	Spent time
<input type="checkbox"/> 92	Feature	In Progress	Normal	Remove build system dependence on UPS	05/17/2018 10:29 PM	<div style="width: 100%;"></div>	160.00	0
<input type="checkbox"/> 93	Task	In Progress	Normal	↳ Research cetbuildtools	05/04/2018 09:59 PM	<div style="width: 100%;"></div>	40.00	22.00
<input type="checkbox"/> 94	Feature	In Progress	Normal	↳ Modify cetbuildtools	05/17/2018 10:13 PM	<div style="width: 100%;"></div>	64.00	26.50
<input type="checkbox"/> 95	Feature	Resolved	Normal	↳ Build cetlib	05/17/2018 09:33 PM	<div style="width: 100%;"></div>	16.00	27.00
<input type="checkbox"/> 96	Feature	Resolved	Normal	↳ Build fhiccpp	05/17/2018 09:36 PM	<div style="width: 100%;"></div>	8.00	12.00
<input type="checkbox"/> 97	Feature	Resolved	Normal	↳ Build messagefacility	05/17/2018 09:36 PM	<div style="width: 100%;"></div>	8.00	1.00
<input type="checkbox"/> 98	Feature	Resolved	Normal	↳ Build canvas	05/17/2018 09:37 PM	<div style="width: 100%;"></div>	8.00	4.00
<input type="checkbox"/> 99	Feature	In Progress	Normal	↳ Build art	05/25/2018 03:16 PM	<div style="width: 100%;"></div>	16.00	4.00
<input type="checkbox"/> 100	Feature	New	Normal	art module SDK	05/22/2017 11:36 AM	<div style="width: 0%;"></div>	40.00	0
<input type="checkbox"/> 101	Feature	New	Normal	ROOT ntuple output module	05/22/2017 04:53 PM	<div style="width: 0%;"></div>	320.00	0
<input type="checkbox"/> 131	Feature	New	Normal	art package system	05/17/2018 10:52 PM	<div style="width: 0%;"></div>	105.00	1.00
<input type="checkbox"/> 132	Feature	New	Normal	Geometry service	05/22/2017 05:14 PM	<div style="width: 0%;"></div>	470.00	0
<input type="checkbox"/> 133	Feature	New	Normal	↳ Geometry backend research	05/22/2017 05:11 PM	<div style="width: 0%;"></div>	210.00	0
<input type="checkbox"/> 134	Feature	New	Normal	↳ Geometry backend implementation	05/22/2017 05:12 PM	<div style="width: 0%;"></div>	210.00	0
<input type="checkbox"/> 135	Feature	New	Normal	↳ Geometry service module	05/22/2017 05:14 PM	<div style="width: 0%;"></div>	50.00	0
<input type="checkbox"/> 136	Feature	New	Normal	Conditions service	05/24/2017 09:40 AM	<div style="width: 0%;"></div>	265.00	0
<input type="checkbox"/> 137	Feature	New	Normal	↳ Conditions service module	05/22/2017 05:19 PM	<div style="width: 0%;"></div>	105.00	0
<input type="checkbox"/> 138	Feature	New	Normal	↳ Conditions service backend	05/24/2017 09:41 AM	<div style="width: 0%;"></div>	160.00	0
<input type="checkbox"/> 351	Task	In Progress	Normal	Project version control, bookkeeping	05/17/2018 09:24 PM	<div style="width: 100%;"></div>	80.00	9.00
<input type="checkbox"/> 352	Bug	New	Low	FHICL Python module does not load	05/17/2018 10:08 PM	<div style="width: 0%;"></div>	4.00	0
<input type="checkbox"/> 353	Bug	New	Normal	cetskelgen throws Perl warnings on macOS	05/17/2018 10:37 PM	<div style="width: 0%;"></div>	2.00	0

Issues

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Task progress

Prototype JLab version of *art*

The screenshot shows the GitHub interface for the repository 'JeffersonLab / art-jlab'. At the top, there are navigation links for 'Pull requests', 'Issues', 'Marketplace', and 'Explore'. The repository name is 'art-jlab' and it is marked as 'Private'. It has 7 unwatched items, 0 stars, and 0 forks. Below the repository name, there are tabs for 'Code', 'Issues', 'Pull requests', 'Projects', 'Wiki', 'Insights', and 'Settings'. The main content area shows the repository name 'art @ JLab setup tools and support libraries' with a link to 'https://redmine.jlab.org/projects/art...'. Below this, there are statistics: 60 commits, 1 branch, 0 releases, and 1 contributor. There are buttons for 'New pull request', 'Create new file', 'Upload files', 'Find file', and 'Clone or download'. A list of commits is shown, with the most recent one by 'hansenjo' updating 'cetbuildtools v7_03_03'. Below the commits, there is a section for the 'README.md' file, which contains the title 'art @ JLab' and a description: 'Tools, scripts and patches for setting up Fermilab's art event processing framework at JLab.'

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60 commits 1 branch 0 releases 1 contributor

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hansenjo Update to cetbuildtools v7_03_03 Latest commit c50c70 23 days ago

buildtools	Update to cetbuildtools v7_03_03	23 days ago
catch	Update README files	23 days ago
patches	Patch for range submodule top-level CMakeLists.txt	23 days ago
range	Update README files	23 days ago
tarfiles	ART_SUITE_v2_11_02 sources and first set of patches for JLab environment	24 days ago
.gitignore	Initial commit	27 days ago
.gitmodules	Update submodules	23 days ago
README.md	Update README files	23 days ago

README.md

art @ JLab

Tools, scripts and patches for setting up Fermilab's [art](#) event processing framework at JLab.

Task List for Simulation & Reconstruction Software

<https://redmine.jlab.org/projects/solid-software>

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#	Tracker	Status	Subject	% Done	Updated	Estimated time
SoLID Reconstruction 35						
<input type="checkbox"/> 102	Feature	New	Basic data model		06/29/2017 05:35 PM	105.00
<input type="checkbox"/> 109	Feature	New	tracking		06/29/2017 11:11 PM	2235.00
<input type="checkbox"/> 110	Feature	New	↳ SIDIS & Jpsi track pattern recognition		06/27/2017 01:31 PM	640.00
<input type="checkbox"/> 111	Feature	New	↳ SIDIS & Jpsi track fitting		06/29/2017 11:11 PM	800.00
<input type="checkbox"/> 201	Task	New	↳ Jpsi track resolution with background		06/29/2017 11:11 PM	
<input type="checkbox"/> 200	Task	New	↳ SIDIS NH3 track resolution with background		06/29/2017 11:10 PM	
<input type="checkbox"/> 199	Task	New	↳ SIDIS He3 track resolution with background		06/29/2017 11:04 PM	
<input type="checkbox"/> 113	Task	New	↳ J/Psi target reconstruction		06/27/2017 01:32 PM	160.00
<input type="checkbox"/> 112	Task	New	↳ SIDIS He3 target reconstruction		06/27/2017 03:17 PM	320.00
<input type="checkbox"/> 218	Task	New	↳ SIDIS NH3 target reconstruction		06/27/2017 02:43 PM	320.00
<input type="checkbox"/> 114	Task	New	↳ SIDIS & J/Psi tracking characterization		06/18/2017 04:43 PM	320.00
<input type="checkbox"/> 105	Feature	New	↳ PVDIS track pattern recognition		06/27/2017 12:40 PM	160.00
<input type="checkbox"/> 106	Feature	New	↳ PVDIS track fitting		06/29/2017 11:11 PM	105.00
<input type="checkbox"/> 198	Task	New	↳ PVDIS track resolution with background		06/29/2017 11:11 PM	
<input type="checkbox"/> 107	Task	New	↳ PVDIS target reconstruction		06/27/2017 01:35 PM	105.00
<input type="checkbox"/> 108	Task	New	↳ PVDIS tracking characterization		06/27/2017 12:41 PM	210.00
<input type="checkbox"/> 205	Task	New	↳ simple documentation with howto		06/29/2017 11:12 PM	
<input type="checkbox"/> 116	Feature	New	Cherenkov amplitude sum		05/22/2017 04:10 PM	105.00
<input type="checkbox"/> 117	Feature	New	MRPC ToF analysis		05/22/2017 02:35 PM	105.00
<input type="checkbox"/> 118	Feature	New	Likelihood PID analysis		05/22/2017 02:40 PM	210.00

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Next Steps (open for discussion)

- Update *art-jlab* to current *art* 3.02 (to be released soon)
- Add user-friendly setup scripts, documentation
- Write SDK
- Make complete package available as **Docker image**
- Begin developing **data model**
- Adapt/develop services (geometry, parameters, ...)
- **Milestone:** full migration of existing GEMC simulations to *art* (or at least a generic, framework-independent implementation)

Who is available to work on this?

Considerations

- Experience shows that projects like this best succeed when 1–3 genuine experts with a **shared vision** “just do it”
- We may have 8–10 years to develop SoLID software (**ETA “FY 2027”**)
- Upcoming **SBS program** has major software needs, short timeline (< 2 years), hence high priority, manpower drain

Conclusions

- We certainly have a plan, but the **path to implementation** suffers from lack of manpower
- *art* continues to be under active development at Fermilab and continues to be the most attractive framework choice for SoLID to me at this time, though its current limitations should be given thought
- Time seems less of the essence than previously thought, a consideration that we should include in our priorities and decisions