

TRIUMPH GULF COAST, INC. PRE-APPLICATION FORM

APPLICANT INFORMATION

Name of Organization: Northwest Florida Supercomputer Research Group (NWFSRG) a non-profit organization.

Proposed Title: Operation of Supercomputers for Defense, Academic, and Commercial Uses

Amount of Triumph Funds Requested: \$2,159,800 consisting of \$799,800 for initial facility and equipment and \$1,360,000 of loaded labor for 14 MY

Total Estimated Project Cost: \$7,237,000 over three years, mostly customer funded.

Contact Information

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Names of co-applicants, partners, or other entities, organizations that will have a role in the proposed project or program: Nathaniel Nelson

REQUIRED EXECUTIVE SUMMARY

The NWFSRG has engaged with the US Air Force Research Lab office at Eglin, AFB (AFRL/RW) to partner via a government contract to propose to the Department of Defense (DoD) High Performance Computer Modernization Office (HPCMO) for the reutilization of HPCMO computer assets. HPCMO supports 4 major DoD data centers with purchases of state of the art supercomputers. After several years, the supercomputers are offered for reutilization to DoD sponsored organizations. Several solicitations for reutilization are conducted each year. NWFSRG, teaming with AFRL/RW would be considered high (2nd out of 5 categories) in the prioritization of proposing organizations.

The DoD HPCMO has awarded the team of AFRL/RW and NWFSRG two supercomputers. One large Cray XC40 with 50,976 Intel Xeon E5-2698v3 compute cores operating at 2.3 GHz and a smaller Cray XC40 with 6,752 Intel Xeon E5-2698v3 compute cores operating at 2.3 GHz. The two machines cost approximately \$25,000,000 new and have a residual value of \$9,000,000 now.

Having been awarded two supercomputers from HPCMO, the NWFSRG requires funds to move the equipment to a temporary location in Northwest Florida, put the machine in working order, construct the required water cooling equipment, hire staff to set up the supercomputer for operation, and begin to train staff for sustaining operation. This effort will take approximately 6-9 months, depending upon the supercomputer condition and availability of staff. Once the supercomputer is in operation, Air Force and other DoD customers would contract via the AFRL/RW contract with NWFSRG for use. Since there are no acquisition costs for the supercomputer itself, the billing rate for use would be significantly less

that what organizations would usually pay. (Our intention is to bill at approximate 50% of the rate of Amazon Web Services (AWS)).

- i. NWFSRG seeks startup funds of \$964,170.00 for a nine-month duration.
- ii. Upon award of a computer, Space Florida has agreed to fund the facility and equipment needed for the nonprofit. Other sources of funding will be provided by DoD customers, academia, and commercial interests once the supercomputer is up and running. At a rate of 50% AWS prices, the machine with 57,000 processors could generate \$10,000,000 of customer funding annually at 75% capacity.
- iii. The initial location of the supercomputer will be in a rented facility in Okaloosa county. Permanent facility will be constructed at the NW Florida REEF. The University of Florida college of engineering is excited to collaborate on this endeavor. They want to align this effort with their planned expansion into Northwest Florida and have agreed to co-locate the NWFSRG at the REEF, adding tremendous advantage of efficiency, connectivity, time, and cost.
- iv. Program description:

The AFRL/RW at Eglin AFB currently supports the future development and testing of Air Force armaments that are to be fielded and used for decades. Various armaments programs are being evaluated at Eglin AFB and require significant computational power to assist the government in evaluating contractor performance. Additionally, the USAF Life Cycle Management Center requires computational resources for the management of sustainment of USAF weapons systems.

There are a number of classified programs of strategic national interest undergoing research, development, test, and evaluation (RDT&E) at Eglin. These programs span across all four major Air Force Centers based at Eglin: Air Force Lifecycle Management Center (AFLCMC/EB), Air Force Research Laboratory (AFRL/RW), Air Force Nuclear Weapons Center (AFNWC), and Air Force Test Center (AFTC). These programs include hypersonic weapon development, a Long Range Stand Off (LRSO) weapon, a Stand in Attack Weapon (SiAW), and programs. Not only are the current demands from these programs stressing the need for more classified HPC capabilities, the recent Air Force guidance to implement Model Based Systems Engineering (MBSE) throughout the acquisition process will drive even higher demand for classified HPC capabilities at Eglin.

In addition, Eglin AFB is also home to Air Combat Command's 53rd Operational Test and Evaluation (OT&E) Wing as well home for a critical component of the Air Force Operational Test and Evaluation Center (AFOTEC). Many of the classified programs undergoing RDT&E at Eglin will also undergo OT&E at Eglin with the 53rd Wing and AFOTEC, which further underscores the need for additional HPC capability in the Eglin complex.

While primarily providing HPC support to military and defense contractors, as a non-profit the NWFSRG corporate charter calls for partnering with academia through paid internships, scholarships, and grants for STEM initiatives. Available funding for these efforts will be sourced from remaining revenue after expenses. Our engagement with academia will

range from post graduate to elementary education levels. It will be administered on both an individual and program level.

The primary objective of our partnership with the full spectrum of academia is workforce development. We see the placement of an HPC at Eglin as a force multiplier for developing the future workforce needed in this highly skilled and undermanned field. The placement of a HPC at Eglin AFB fulfills a dual critical mission—direct support of the various armament test missions and the development of a skilled workforce for today and tomorrow’s defense needs. Partnerships have begun to create collaboration among Florida public universities to include U of F, NWFSC, UWF, and FSU to focus workforce development on high skill talent in great demand in our heavy defense industry region. Support from and collaboration with the Hsu Foundation will be the beginning of K-12 STEM focused exposure.

In partnership with AFRL-Eglin, the NWFSRG through affiliations it will establish with regional universities will form a consortium of academic institutions focused on bringing attention and hands-on opportunities to both undergraduate and graduate level students. This increased awareness of workforce opportunities in the government and defense sectors post-graduation will help address the critical shortage of highly skilled labor and help to build a candidate pool for both sectors. All participants, whether they pursue future employment in the defense arena, will have a greater appreciation of the nation’s defense needs and correspondingly will be an advocate for fiscal support.

Having a supercomputer of world class size in the Okaloosa County area will transform the government, academic, and commercial uses of computer power in the local area. Currently Eglin AFB users must access HPCs in Ohio which is especially difficult for classified users at Eglin AFB. Hypersonic flight is a new and exciting area of research which requires significant computer power to achieve needed results. The NWFSRG will team with local academic organizations to provide grants and access to supercomputer resources for faculty and student research into hypersonic flight, large scale cyber modeling, test data analysis and many more subjects. This will allow for local students in supercomputer science, who must normally leave NW Florida for employment, to be able to remain in the vicinity with interesting work. Since the NWFSRG is a non-profit, proceeds will be plowed back into the community for scholarships, grants, and startup funding for related businesses.

- v. Startup funds are required to be in place by 1 January 2021 in order for the NWFSRG to partner with AFRL/RW in the 2021 setup and initial operation of the two Cray supercomputers. The estimated non-labor and labor breakout is shown below. Please note that all of the labor is shown loaded with fringe benefit costs (healthcare, 401k, etc). These are all well-paying jobs. Additionally, labor for the installation and setup of the facility, security, cooling, and power would be considerable, but not under the direction of NWFSRG.
- vi. In addition to the 14-18 direct jobs listed below, we anticipate >30 full time enabler jobs from industry users for Model Based systems Engineering, M&S, cyber analysis and Hypersonic Computational Fluid Dynamics analysis.

Non Labor Requirements	CY2021		CY2022		CY2023	
Facility Rent	\$ 58,800.00	2500 sf, \$4900/mo	\$ 93,600.00	4000 sf, \$7800/mo	\$ 117,600.00	5000sf, \$9800/mo
Facility Security Upgrade	\$ 250,000.00	\$100/sf	\$ 150,000.00	1500 added sf	\$ 100,000.00	1000 added sf
HVAC	\$ 75,000.00	\$250/ton, 300 tons	\$ 37,500.00	add 150 tons	\$ 37,500.00	add 150 tons
Generator and UPS	\$ 146,000.00	1 MW, 30 min UPS			\$ 76,000.00	add 1MW generator
Utilities 50% utilization	\$ 240,000.00	\$.12/kWH, 8 hrs/day	\$ 480,000.00	100% utilization	\$ 480,000.00	100% utilization
Office	\$ 30,000.00	3 offices	\$ 30,000.00	add 3 offices	\$ 30,000.00	add 3 offices
TOTAL	\$ 799,800.00		\$ 791,100.00		\$ 841,100.00	
Labor (Loaded rates)						
NWFSRG Leadership	\$ 250,000.00	1.25 MY	\$ 275,000.00	1.375 MY	\$ 300,000.00	1.5MY
Set up HPCs	\$ 300,000.00	6 staff, 6 mo, 3MY	\$ 300,000.00	New HPC acquisition, 3MY		
Operate HPCs	\$ 150,000.00	3 staff, 6 months, 1.5MY	\$ 400,000.00	4MY	\$ 400,000.00	4 MY
Overhead and security staff	\$ 160,000.00	2MY	\$ 160,000.00	2MY	\$ 160,000.00	2MY
Business Development	\$ 100,000.00	1MY	\$ 100,000.00	1MY	\$ 100,000.00	1MY
Subcontractor Labor, scientific	\$ 300,000.00	2MY	\$ 450,000.00	3MY	\$ 600,000.00	4MY
Intern labor	\$ 100,000.00	4MY	\$ 100,000.00	4MY	\$ 100,000.00	4MY
TOTAL	\$ 1,360,000.00		\$ 1,785,000.00		\$ 1,660,000.00	
Total Direct Labor Man Year		14.75		18.375		16.5
Average loaded labor rate		\$ 92,203.39		\$ 97,142.86		\$ 100,606.06
Annual Total labor and non-labor	\$ 2,159,800		\$ 2,576,100		\$ 2,501,100	

